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If You Don't Like This, You May Resign And Go Home: Commanders' Considerations In Assaulting A Fortified Position

by

Michael Woodgerd

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Thesis Advisor: Russel H. S. Stolfi

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The author studies the experiences of British, German, American and Soviet armies in assaults on fortified positions to find critical considerations for contemporary commanders. A fortified position is a series of mutually supporting areas comprising bunkers, pillboxes, weapons emplacements, entrenchments, wire, mines and other obstacles. Assaulting such a position held by determined defenders is a uniquely brutal and bloody event. The author systematically studies fighting at El Alamein, the Normandy Campaign, Okinawa, the Siegfried Line, Kursk, Manchuria and the Petsamo-Kirkenes area. Each battle is examined in terms of the use and importance of intelligence, smoke, armor, infantry, engineers, artillery, air support, C2 and special weapons. A portion of this study also examines current training at the U.S. Army's National Training Center to find if current training reflects battle proven techniques. The conclusion offers the author's recommendations to assist commanders and staffs in determining the organization, equipment, tactics, training and means of control of forces in the assault of a fortified position.

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If You Don't Like This, You May Resign And Go Home: Commanders' Considerations In Assaulting A Fortified Position

by

Michael Woodgerd
Captain, United States Army
B.S., United States Military Academy 1982

Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

The author studies the experiences of British, German, American and Soviet armies in assaults on fortified positions to find critical considerations for contemporary commanders. A fortified position is a series of mutually supporting areas comprising bunkers, pillboxes, weapons emplacements, entrenchments, wire, mines and other obstacles. Assaulting such a position held by determined defenders is a uniquely brutal and bloody event. The author systematically studies fighting at El Alamein, the Normandy Campaign, Okinawa, the Siegfried Line, Kursk, Manchuria and the Petsamo-Kirkenes area. Each battle is examined in terms of the use and importance of intelligence, smoke, armor, infantry, engineers, artillery, air support, C2 and special weapons. A portion of this study also examines current training at the U.S. Army's National Training Center to find if current training reflects battle proven techniques. The conclusion offers the author's recommendations to assist commanders and staffs in determining the organization, equipment, tactics, training and means of control of forces in the assault of a fortified position.

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I. INTRODUCTION

Once more into the breach, dear friends
once more;
Or close the wall up with our English dead!
Shakespeare: King Henry V, iii, 1598

It is right to learn, even from the enemy. (Fas est et ab hoste doceri.)
Ovid: Metamorphoses, iv, c. 8 A.D.

A. PURPOSE

An attacker must have the ability to conduct any type of attack, so that he can hoist his opponent onto the "horns of a dilemma".[1] Modern commanders seek to bypass or encircle, rather than attack, a fortified position consisting of bunkers, reinforced weapons emplacements and entrenchments protected by mines, barbed wire and other obstacles.[2] While not advocating such assaults, the author contends that the U.S. Army must have the ability to successfully make such an assault. Such ability forces the defender to prepare for multiple eventualities and thus weakens him. The added doubt in a defender's mind could contribute to his defeat. The key to developing this particular skill, which was until very recently virtually a forgotten art in the U.S. Army, lies in the study of historical precedents. This thesis will compare historical lessons from various armies at

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[1] General William T. Sherman, quoted in Sir Basil Liddell Hart and Adrian Liddell Hart, The Sword and The Pen (New York: Thomas Crowell, 1976), 273.

[2] The definition of a fortified position is paraphrased from U.S. Military Assistance Command Vietnam (USMACV), Attack of Fortified Positions In The Jungle, Seminar Report. (Saigon: USMACV, 2 Jan 1968), 1. Defense Technical Information Center (DTIC) No. AD 844097.

various times and locations to find relevant similarities important to success in all times and in all places. These lessons will then be used to examine current Army training. This thesis hypothesizes that current methods do not take key factors into account in the areas of tactical organization, special equipment or assault weapons. In addition, current methods may be ineffective and too complicated when compared with combat proven techniques. The goal of this thesis is to provide commanders and their staffs with a list of factors that they must consider in order to properly organize their forces for the attack. This organization will then determine the techniques of command and control necessary to accomplish the mission. These techniques will vary from situation to situation, so this author will merely include several techniques for others to consider.

B. BACKGROUND

A deliberate attack against a well entrenched defender protected by obstacles is exceptionally difficult. The attacking forces must consider myriad factors of Command and Control[3] (C2) to properly synchronize available assets. For various reasons, armies throughout history have assaulted fortified positions. Many of these assaults rank among decisive turning points in war, for example Kursk and El Alamein in World War II.

---

[3] C2 is defined as-The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. See JCS Pub 1, (Washington, D.C.: The Joint Chiefs of Staff, 1 June 1987), 77.

C. SIGNIFICANCE

A fortified position is a series of mutually supporting areas comprising bunkers, pillboxes, weapons emplacements, entrenchments, wire, mines and other obstacles. Assaulting such a position held by determined defenders is a uniquely brutal and bloody event. Deafening noise, concussion, choking dust and smoke, flame from weapons and exploding vehicles, screams of the wounded and shouted commands are all integral components of such an assault. Weaker forces use field fortifications to inflict casualties and to buy time. Every campaign from WWII to the Gulf War has seen fortified positions and such positions will continue to be used. Our forces must have the capability to assault through these positions with few casualties. If poorly reconnoitered, planned, equipped, led and executed, such assaults will degenerate into sickening futility. If done properly, such attacks will break through with minimum loss of time and lives. Much work is currently going on within the U.S. Army on the problem of assault against fortifications. This author hopes to add significantly to the body of knowledge and help validate certain concepts.

D. ASSUMPTIONS

The basic weapons and forces of conventional land combat will remain the same for the foreseeable future. The tactics, techniques and equipment used by defenders and attackers have remained little changed from WWII to the present and no great change is forthcoming. Ditches, barbed wire, bangalore torpedoes and fascines, for example, have changed little at all in their long history. Thus, the composition of a Soviet assault team

in 1945 in Manchuria mirrored the U.S. Marine assault team on Okinawa and should closely resemble a U.S. Army assault team of today.

E. THESIS ORGANIZATION

A brief description of each chapter follows which will guide the reader through the organization of the thesis.

1. Chapter I

This chapter offers a brief background and purpose of the thesis and addresses the topic's importance.

2. Chapter II

This chapter gives the reader an historical overview of field fortifications and their significance on warfare. It traces the development of means for attackers to counter defenders' advantages. This chapter generally familiarizes the reader with the overall subject and introduces certain concepts to facilitate understanding the body of the thesis.

3. Chapters III through VI

In this portion of the thesis, the author will analyze different armies in different phases of WWII using a similar analysis structure. This standard analysis format will facilitate recognition of certain constant factors and facilitate comparisons.

4. Chapter VII

Currently, much of the body of knowledge in the U.S. Army comes from its Combat Training Centers. This chapter will look at training as it now exists and compare it with historical lessons.

5. Chapter VIII

The final chapter will offer the author's conclusions and a summary of findings. The results of the study will provide recommendations to assist commanders and staffs in determining the organization, equipment, tactics, training and means of control of forces in the attack against a fortified position. These recommendations will allow the commander and his staff to choose the best techniques and technical means to deal with the situation at hand.

II. EVOLUTION OF ASSAULTS AGAINST FORTIFIED POSITIONS

- 52 B.C. through A.D. 1939

> ...Then when they (the Gauls) came up closer, they were soon caught unawares on the spurs, or sank into the pits and were impaled, or were shot by artillery pikes from the rampart and turrets, and so perished on every side.
> *Julius Caesar in Bellum Gallicum*

A. ALESIA: ONE HUNDRED YARDS OF HORROR

1. Background

In the spring of 52 B.C., the Gaul Vercingetorix led most of Gaul (modern France) in revolt against Roman occupation. Caesar besieged his opponent in the town of Alesia and began fortifying. When the relief force of Gauls arrived outside, the Romans faced odds somewhere between 1:1 and 6:1 to the advantage of the enemy. The Gauls, however, faced a giant fortified doughnut with the Romans inside. Around Alesia stretched twenty five miles of ramparts (fourteen miles in the outer ring and eleven in the inner ring), including towers and palisades, and about fifty miles of trenches. On the outside of the perimeter, the relieving Gauls faced one hundred yards of obstacles before they could grapple with the Romans. An attacking Gaul first encountered *stimuli* -- ankle high iron hooks embedded in buried wooden beams --, pits of wooden spikes, a double row of sharpened branches anchored in the ground or *cippi*, and two trenches of fifteen

foot depth and water filled in places. After these outer works came the actual towers and palisades containing the Romans. The towers provided launching platforms for auxiliary slingers and archers to engage the attackers while they struggled through the obstacles.

2. Narrative

The fighting itself covered two days and included three assaults, one of them at night. The field fortifications played the desired role. They slowed down the attackers and enabled the Roman auxiliary "artillery" to wear down and demoralize the attackers. The physical separation of the two Gallic forces precluded effective coordination, thus inviting defeat in detail. Finally, the defenses enabled the Roman to hold portions with fewer men and use other forces to counterattack. This counterattack of infantry and cavalry under Labienus caught the outside Gauls in the flank and rear, breaking the final attack. Vercingetorix surrendered the next day and Gaul remained under Caesar's control.'[4]

B. INTERLUDE

Through the following centuries, field fortifications played virtually no role, overshadowed by castles and fortified towns. While the assault of such positions makes fascinating study, especially the part played by that initial assault party so aptly named the "Forlorn Hope", such assault lies beyond the scope of this study.

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[4] The story of the siege of Alesia has been paraphrased from Robert L. Bradley, "Designer's Notes" chapter in Alesia wargame rules, (Baltimore, MD: Avalon Hill, 1976), 11-14, and Hans Delbruck, History of the Art of War, Vol II. Trans. Walter J. Renfroe, Jr. (Westport, CN: Greenwood Press, 1980), 495-507.

C. 19th CENTURY: THE SPADE REDISCOVERED

In the mid-nineteenth century, the development of the rifled musket gave field fortifications new significance. One key role of fieldworks was to give protection to defending troops, which made their fire more effective against attackers in the open. The extended range of infantry weapons kept enemy artillery at bay and led to brutal losses among attacking infantry, whose fire was nullified by trenches, breastworks, and other works. By 1864, American defensive works showed high quality, as veteran infantry became adept at digging in.[5]

1. The American Civil War

During this period field fortifications,

> ...became an integral aspect of infantry tactics...It was in utilization of improvised field fortifications that Robert E. Lee surpassed all of his contemporaries; most of his victories were the result of his ability to use hasty entrenchments as a base for aggressive employment of fire and movement.[6]

In fact, Lee became known as "the King of Spades" for his defenses near Richmond.[7] Attackers developed no new tactics or equipment to overcome these fortifications by assault, as thousands of men, both North and South discovered.

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[5] John Miller, Jr. "Men, Weapons and & Tactics," Army Information Digest, August 1961: 50.

[6] Trevor N. Dupuy, "The Impact on Today's Army," Army Information Digest, August, 1961: 124.

[7] Eugene F. Hart, "Revolution in Technology and Logistics," Army Information Digest, August, 1961: 109.

A stunning example of what happens to attackers who practice poor scouting, planning and tactics in attacking well entrenched defenders came on June 3, 1864 at Cold Harbor, Virginia. Defending Confederates killed, wounded or captured 7,000 Union attackers within eight minutes, while suffering almost no losses themselves. A blood stained diary found on one of the dead concluded, "June 3. Cold Harbor. I was killed."[8]

2. 1865 to 1914

An astute observer could already see that field fortifications played a key role in many battles, with the defender's fires doing the significant killing, rather than the obstacles themselves. As long as the attacker and defender are roughly equal in mobility, protection and firepower (mostly portable), the advantage lies with the defender who is protected by obstacles and entrenchments. Most observers discounted these lessons for various reasons.

> ...Earthworks reappeared at Plevna in 1877-78, in South Africa in 1899-1900, and in Manchuria in 1904-05, yet the number of military writers in Europe who appreciated this phase of the Civil War could be numbered on the fingers of one hand.[9]

D. A MUDDY CORNER OF HELL: THE FIRST WORLD WAR EXPERIENCE

The trench warfare of 1914-1918 on the Western Front saw the most extensive field fortifications in history, stretching from Switzerland to the North Sea. These trenches,

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[8] This account of Cold Harbor is paraphrased from Shelby Foote, The Civil War: A Narrative, Vol. 3 Red River to Appomattox, (New York: Random House, 1974), 290.

[9] Jay Luvass, "Influences on Foreign Army Tactics and Strategy," Army Information Digest, August 1961, 116.

dugouts and wire gave the defenders protection, robbed attackers of mobility, and, when coupled with machine guns, contributed to the butchery of millions.

> First came the preliminary bombardment...then the attack, with perhaps a fortunate few, generally very few, reaching the first German trenches to bayonet the survivors there; a brief pause, then the enemy's deadly barrage on their own captured positions, followed by the inevitable counterattack; finally, the attackers, too few to hold their ground, driven back to their own trenches, decimated relics of the original force; the remaining three-quarters to nine-tenths dead, or dying with their bowels hooked on the wire of No Man's Land, knowing...there would be no truce to collect the wounded, and hoping only to attract the merciful attention of an enemy machine-gunner...And the only thing it had proved was that this was no way to win a war.[10]

1. The Somme

The bloodiest day of a bloody war came on 1 July, 1916 -- the first day on the Somme. This marvelous display of international coordination -- the Germans provided the machine guns and bullets, the British the targets -- saw both murderous stupidity and some significant tactical acumen. Unfortunately for the 60,000 British casualties (20,000 dead and 30,000 wounded or missing in the first hour),[11]stupidity predominated. General Rawlinson, the Fourth Army Commander, endorsed a plan which supposed that a lengthy (five days) artillery barrage would destroy all defensive works, cut the wire and kill or numb the defenders. Rawlinson considered the new infantry -- Kitchener's New Army -- incapable of anything beyond walking forward, burdened by an average load of sixty pounds, in straight ranks. The plan called for an assault in daylight (so that the

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[10] Alistair Horne, The Price of Glory: Verdun, 1916 (New York: Penguin, 1964), 34.

[11] These figures come from Martin Middlebrook, First Day on the Somme (New York: Norton, 1972), 148. This book makes compelling, if chilling, reading and is a main source for many other works.

French could observe artillery effectiveness) and rejected Haig's suggestion that scouts should go forward to ascertain the effect of the artillery preparation.[12] This is an example of the commonly occurring confusion of firepower for the attacker instead of fire effectiveness. This artillery preparation incorporated numerous failings within itself. Though many shells were fired, many failed to explode and most (seventy five percent) were shrapnel. Shrapnel, which burst above ground and showered metal fragments forward in a conical pattern,[13]had to be perfectly timed and precisely laid to cut wire. With inexperienced gunners filling the new units and worn artillery tubes, the shrapnel had little effect on the wire and even less on protected troops.[14] The shelling swept forward in splendid isolation from reality, the gunners firing on a timetable that only the Corps Headquarters could alter. These headquarters lay miles from the front at the wrong end of miles of telephone wire and the critical hundreds of yards of No-Man's Land.[15] Units that followed these orders precisely met disaster.

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[12] The overall description of the plan of the Somme offensive is the same in all works on the subject. These details of the why are found in A.J.P. Taylor, The First World War (New York: G.P. Putnam, 1972), 133-136.

[13] The precise description of the shrapnel burst pattern is described in Shelford Bidwell and Domenick Graham, Firepower: British Army Weapons and Theories of War 1904-1945, (Boston: George Allen & Unwin, 1985), 84.

[14] The composition of the barrage and the high dud rate come from Middlebrook, First Day, 282-283.

[15] The geographical locations, control measures and communication layout is found in Martin Van Crevald, Command In War (Cambridge, MA: Harvard University Press, 1985), 160.

Even in this bleak day some units displayed a firm grasp of reality, disregarded orders, and did their best. The 36th (Ulster) Division sent men into No-Man's Land early and followed the barrage with a headlong Irish rush that took the first enemy trenchline. Major General Ivor Maxse put much of his 18th division out early as well and employed rushing tactics to beat the defenders to the firing step. Maxse had trained his men to accept six percent casualties from friendly artillery to insure that they followed it closely enough.[16]

2. Deadlock: A Search For A Solution

The evolution towards the proper way to assault significant field fortifications continued. Artillery did, when well used, cause enough losses to defenders to offset the superior fire of the defending machine guns. This, unfortunately, remained more the goal than the reality. If the attacking infantry could follow closely enough, it would have protection across No-Man's Land and win the race to the parapets. Tactical mobility, though, remained an atrocious problem. The churned up earth made rapid attack, reinforcement, resupply or exploitation in significant numbers virtually impossible. The rigidity of artillery fire, a product both of inflexible thinking and the very real difficulty of communicating from the lead troops back to the guns, also remained a problem. The British incorporated Lewis gun teams and bomb throwing teams into infantry platoons to give more portable firepower,[17] but the tank became the best solution to give attackers

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[16] Middlebrook, 284.

[17] John English discusses British small unit organization in his book, On Infantry (New York: Praeger, 1981), 58.

protection and the portable, responsive firepower they needed to regain offensive movement.

3. Deadlock: The German Solution

While the British moved towards the technical solution of the trench stalemate by developing armored vehicles, the Germans looked more towards reviving "stalking methods."[18] The German development of what came to be known as "infiltration" tactics was "...the product of an effective corporate effort" and the Germans emphasized the coordination, or working together, *das Zusammenwirken* of all combat elements.[19]

Following the fiascos of 1915, both sides had men who realized the need for new tactics. A French Captain Laffargue wrote a pamphlet which proposed that light cannon accompany infantry, machine guns and automatic rifles be pushed forward and that mortars be used to suppress enemy in trenches. He suggested that patrols "creep through" weak spots and leave strongpoints for follow up waves. The Allies ignored the document. The Germans captured a copy, translated it and issued portions of it as a

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[18] English attributes this quote describing a more flexible, fieldwise, savvy style of fighting to Sir Basil Liddell Hart. See English, Infantry, 22.

[19] For an excellent overall account of German tactical doctrine's development see, Timothy Lupfer, The Dynamics of Doctrine: The Changes in German Tactical Doctrine During The First World War.Leavenworth Paper No. 4 (Ft. Leavenworth, KS: Combat Studies Institute, 1981), 8, The concept of corporate effort is found on 42-44.

training manual.[20] German thought already leaned towards "infiltration" tactics and the first major test of such thinking came at Verdun on 21 February, 1916.

a. Verdun

Following the first bombardment, that was more effective than British ones because the Germans had heavier artillery and mortars than the Allies and knew high explosive worked better than shrapnel, German patrols crept forward and sought out soft spots. Instead of flooding through, though, they merely found where the French still held so more shelling could pave the way for later attacks. Flamethrowers, first tested in combat a year earlier,[21] also played a key role that day, because their shock effect seriously demoralized many defenders.[22]

Finally, the talents of many good officers from Captain to General culminated in the final version of "infiltration" tactics and the quality of German non-commissioned officers made these tactics possible. Special units of young, fit and aggressive soldiers were formed into *Sturmabteilungen* -- storm detachments.

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[20] Laffargue is discussed by English and Lupfer. See English, Infantry, 18-19, and Lupfer, Dynamics of Doctrine, 38-39.

[21] Bruce Gudmundsson, "German Flamethrowers of World War 1", [1990], pp. 1-16. Unpublished article in possession of the author.

[22] Horne, Glory, 91.

b. Storm Troops

These *sturmabteilungen* carried,

> ...lightweight machine-guns, light trench mortars and flamethrowers, and their duty was to cross the trench-lines, by-pass centres of resistance and machine-gun posts and if possible break through to attack the enemy artillery.[23]

Ludendorff directed that artillery must respond to the infantry and shift fire as necessary. The immediate follow on waves comprised "battle units" of infantry, machine-gunners, trench mortars, engineers, field artillery and ammunition carriers. All men received cross training and firm orders to keep pushing deep. These groupings gave the attackers significant portable firepower, but artillery remained the decisive provider of fire effectiveness on entrenched defenders. To support these new tactics, Ludendorff listened to a Lieutenant Colonel Bruchmüller who used short bombardments to achieve surprise. Bruchmüller's timing of artillery fires and heavy use of gas concentrated on disruption of command and control and did not churn up ground so badly as to make rapid movement impossible.[24]

4. Summation

When the armistice silenced the gunfire on the Western Front, both sides had found solutions to breaking through extensive field fortifications. Neither was totally satisfactory for a variety of reasons. Artillery could only be shifted within limited parameters because of reliance on flares, runners, etc. Lack of mobility limited

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[23] Barrie Pitt, 1918: The Last Act (New York: Ballantine Books, 1962), 61.

[24] Discussion of artillery and unit compositions, training and missions comes from Pitt, 1918, 61-65.

exploitation or the forward movement of artillery. Intelligent men had come up with, at least in the formulative stages, almost every key piece of equipment and tactical organization necessary. The interwar years would see radio improve to permit tactical use at lower levels. The combination of aggressive, decentralized tactics, tanks and aircraft now awaited only optimum combination and direction. Landmines would grow to be a much greater threat.[25] By 1939, however, all the major technologies and tactics sat on the stage or in the wings. The Second World War would give modern commanders valuable lessons in using these assets in their attacks.

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[25] In WWI, Germans used artillery shells as crude landmines, but they would not play a major role until WWII. Mines are discussed extensively by Russel H. Stolfi, Mine and Countermine Warfare In Recent History, 1914-1970. Report No. 1582. (Aberdeen Proving Grounds, MD: Ballistic Research Laboratory, 1972), 13.

III. THE BRITISH EXPERIENCE: A TRADE UNION[26] APPROACH TO WAR

> There is nothing certain about war except that one side won't win.
> *Sir Ian Hamilton: Gallipoli Diary, 1920*

A. EL ALAMEIN: WORLD WAR ONE REVISITED

1. Terrain

El Alamein, itself little more than a village signpost, lay in the forty-mile wide gap between the Mediterranean Sea on the north and the Quattara Depression on the south. The Quattara Depression, a large expanse of virtually impassable salt marshes, prohibited movement of any significant forces. Alexandria, with British supply depots and ports, lay sixty miles to the east.

The ground is best described as flat, with scrub thorn in areas. Sand drifted, but not in giant dunes of the "Beau Geste" movie image. Indeed, the barren and rocky ground prevented deeply entrenching in most areas.[27] Although the "flat" ground actually contained folds and differing elevations, the slightness of the variations made

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[26] This phrase describes the narrow minded selfishness of the combat branches in the British Army. See LTC Michael Quirk, "Assault On a Defensive Line," (National Training Center: Observation Division, 1990), 3.

[27] For the physical description of the battlefield, see: Peter Young, A Dictionary of Battles (1816-1976), (New York: Mayflower Books, 1977), 456-457, Burton Maughan, Tobruk and El Alamein, Australia In The War of 1939-1945, (Canberra: Australian War Memorial, 1966), 639-745, James Lucas, War In The Desert: The Eighth Army at El Alamein, (New York: Beaufort Books, 1982), 122-166, and Samuel W. Mitcham, Jr. Rommel's Desert War, (New York: Stein and Day, 1982), 129.

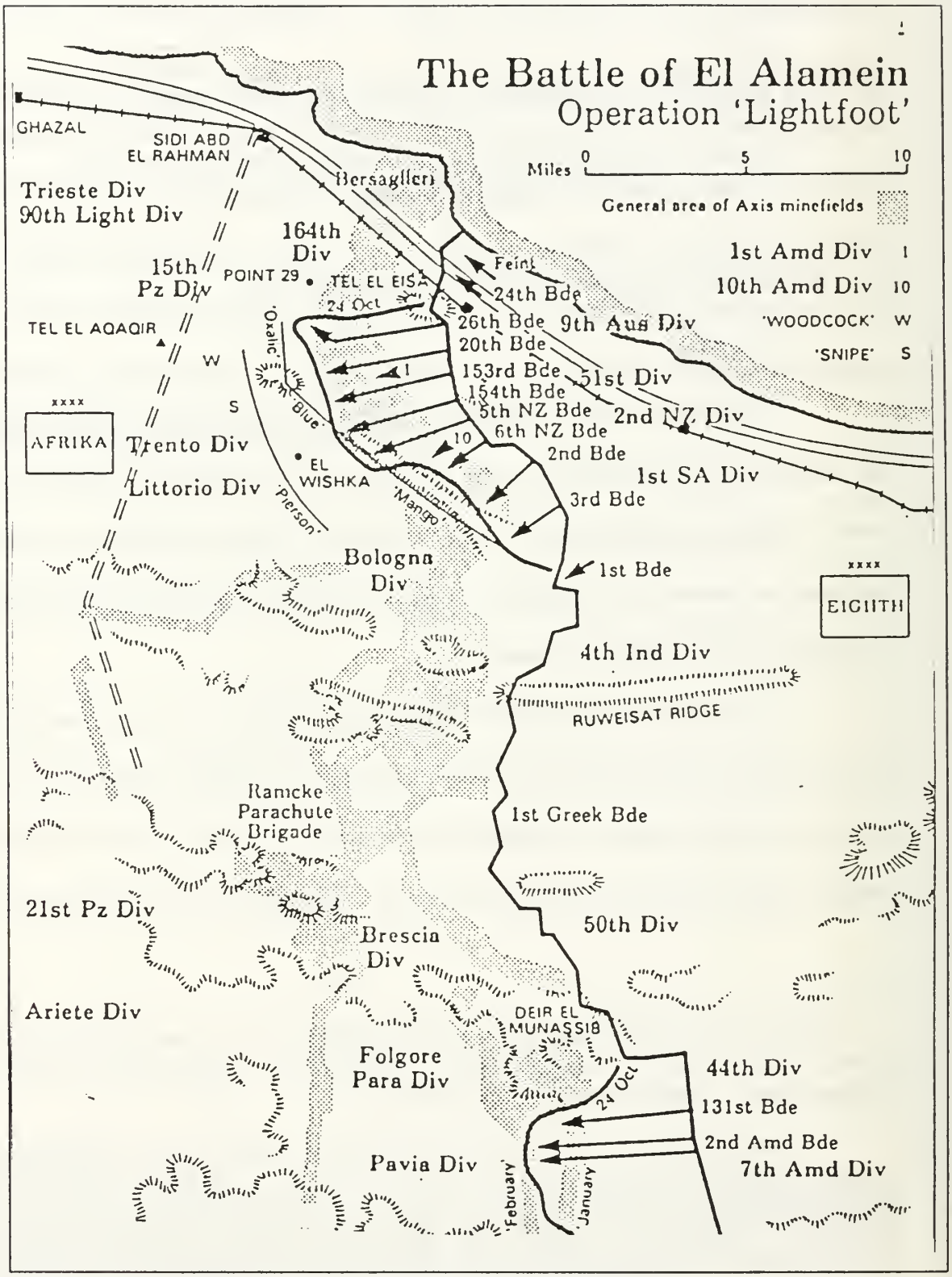

Figure 1: El Alamein (See Lucas, War In The Desert, 188)

navigation exceptionally difficult. Few clearly prominent features existed, and both sides encountered many problems with land navigation. The man made reference points, such as Barrel Hill[28], were critical to many movements.

> ...The El Alamein-Quattara Depression Line was an excellent choice of positions, aside from being the only choice left before the Nile River. For once, there were no flanks to turn. Rommel would have to meet the British Tommy...a dogged defender, head on...Additionally, his long supply line lay exposed to RAF attack.[29]

2. Defenders: Fighting A Battle Without Hope[30]

By mid October of 1942, the Axis forces in Africa faced a grim situation. At the end of a fragile supply line and depleted in strength after their own attacks at Alam el Halfa at the end of July failed to dislodge the British, the Axis forces faced numerically superior enemies without possessing enough fuel on hand fight the mobile war in which the Germans excelled. The Italians, with the exception of the *Folgore* Parachute unit, had poor equipment, leadership and morale. Rommel interspersed his German and Italian units to bolster the latter and in so doing created "...for their defense girdle...a corset

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[28] Barrel Hill was a piece of ground with a navigation beacon, anchored by barrels, on it and an eight digit grid coordinate painted on the barrels. Other references, such as Trig 29, which fill Maughan's account, are map symbols showing that a certain point has been surveyed to be the exact height shown. Some points in the desert had manmade objects to facilitate human navigation, but accounts do not specify clearly enough which ones had markers and which did not to stress these in the text of this report. As always, when using a source written by a British or British Commonwealth author, one must be careful in translating English into American.

[29] Thomas B. Buell, et. l. The Second World War: Europe and the Mediterranean, Volume 1, (West Point, NY: United States Military Academy, 1979), 330.

[30] Erwin Rommel, quoted in Mitcham, Rommel's Desert War, 135.

strengthened with German whale bones."[31] The Germans could only win by preventing the British from bringing sufficient mass to bear at one place and time, and so dug into defensive positions. German engineers uprooted old minefields in the rear areas and laid them in new locations tied into existing ones facing the British. Rommel counted on these "silent soldiers" to canalize the attack into small areas he could mass against and defeat in detail.[32] Artillery would also have more effect when fired against an enemy in a small area.

Overall, the defenders occupied strongpoints spread throughout the mine belts. This disposition would wear down the attackers and engage them throughout the full depth of the sector. There was no one defensive line the British could mass fire on and break through. The best term to describe the defensive disposition is "web defense".[33]

This overall defensive structure showed the well learned lessons of the First World War. Rather than one main defensive line, the Axis forces occupied a number of strongpoints. Rommel wrote,

> ...the defenses were so laid out that the mine-fields adjoining no-man's land were held by light outposts only, with the main defense line, which was two to three thousand yards in depth, located one to two thousand yards west of the first mine belt. The panzer divisions were positioned behind the main defence line...A very large number of mines was used...on the order of 500,000.[34]

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[31] Maughan, Tobruk, 655-656.

[32] Mitcham, Rommel's Desert War, 135.

[33] Major Ferdinand Otto Miksche, Attack: A Study of Blitzkrieg Tactics, (New York: Random House, 1942), 77-90.

[34] Erwin Rommel, The Rommel Papers, quoted in Maughan, Tobruk, 642.

British intelligence summaries described,

> the defence system...from 3,000 to 7,000 yards in depth. There were two main defensive belts about 3,000 yards apart often with little between them, but with east-west "dividing walls" of defensive positions connecting the two main north-south belts at intervals of 4,000 to 5,000 yards, and forming a series of "hollow" areas, ... for defensive fire tasks, and as traps for attackers, who would be exposed to enfilade fire while in an angle of minefields formed by the junction of a dividing wall with the second belt of defenses.[35]

The disposition of the most eastward positions had some important weaknesses besides the previously mentioned strengths. The defensive positions could not fully cover all of the mined areas by direct fire.[36] Since the "No-Man's Land" between the minebelts and the British defenses stretched for roughly three thousand yards,[37]attackers could close up to and begin breaching the minebelts free from direct fire. Once near the defenders, the attackers would be channeled into swept lanes, but this applied only to vehicles, since only a few of the mines were antipersonnel. The antitank mines, which made up the greatest majority of the belts and "marshes", needed heavy weight to set them off.

Behind the infantry strongpoints and the vast majority of the minefields, Rommel positioned his tanks and artillery. The crippling shortage of fuel forced him to disperse the armor in groups across the front. This fuel shortage came partially from help given by Ultra (signal intelligence from the broken German Enigma codes) which helped Allied air and naval forces to

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[35] Maughan, Tobruk, 644.

[36] Mitcham states that General Georg Stumme ran an outpost line in front of the mines, but offers no solid proof that the order was carried out. This outpost line is probably really the first strongpoints within the minebelts. Mitcham also claims patrols with dogs guarded the obstacles, but no other sources mention this.

[37] Maughan, Tobruk, 658.

devastate Axis shipping.[38] The *Luftwaffe* yielded the sky to the RAF the majority of the time anyway, and with this battlefield so close to the major British base in the area, German air could not be counted on for significant assistance. Finally, Rommel himself left to return to Germany in poor health. Ultra reported his departure from North Africa to General Sir Harold Alexander, Montgomery's commander, on September 23rd.[39] General Georg Stumme, with Eastern Front experience, replaced him.

3. Attackers

The British military faced strong pressure from Churchill to attack. On the eve of the battle, Churchill telegraphed the British Commander-in-Chief, Middle East, General Alexander, that "all our hopes" rested on the outcome of the impending battle.[40] The British and Commonwealth forces had numerical superiority, but had demonstrated little tactical skill thus far in the war. Montgomery had branches that could not work together and could not beat the Germans in mobile combat. Playing the cards dealt to him, Montgomery planned a First World War battle with Second World War forces and forced it upon his subordinates. An excellent deception plan, Operation BERTRAM, kept the enemy from divining exact British intentions. The British planned to breach the large minefields the first night and pass through large armored forces to set up hasty defenses on the far side, consisting of tanks, infantry and anti-tank guns. Infantry "crumbling"

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[38] Ronald Lewin, Ultra Goes to War, (London: Hutchinson, 1978), 264-271. Ultra helped far more at the strategic than at the tactical level.

[39] Christopher Argyle, Chronology of World War II, (London: Marshall Cavendish, 1980), 108. Also see Lewin, Ultra, 266-268.

[40] Cesare Salmaggi and Alfredo Pallavisini, 2194 Days of War, trans. Hugh Young, (New York: Gallery, 1979), 301.

operations north and south against the static Axis infantry would force the weak armored forces to intervene or see their infantry chewed up. "My modified plan was now to hold off, or contain, the enemy armour, while we carried out a methodical destruction of the infantry divisions holding the defensive system."[41]

When the Germans counterattacked, the British could weaken them significantly without being drawn out into a mobile battle, which the British had no talent for. One will note however, that this plan expected the attacking infantry and engineers to seize, and clear lanes through defenses anywhere from six to seven kilometers deep and to allow the armor through.

> ...infantry attacks would start at 10 p.m. on 23rd October and were designed to overrun the enemy's minefields and gain possession of his defenses, including the field gun areas, so as to facilitate the passage of the armoured formations to the enemy's rear before dawn.[42]

Such movements through prepared defenses could best be described as optimistic. The final line for the armor to set up its defense by daylight was up to ten miles from friendly front lines.[43]

The plan called for infantry to closely follow a rigid rolling barrage and included pauses for it to pass through follow-on units to maintain momentum. The Eighth Army engaged in methodical rehearsals and practiced following the timetable rigidly. Units also obviously practiced small unit "battle drills" during this time, since narratives consistently stress the rapid reactions to, and reduction of, strongpoints during the advance.

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[41] General Sir Bernard Montgomery, Memoirs, quoted in Maughan, Tobruk, 646.

[42] Maughan, Tobruk, 643.

[43] Lucas, War In The Desert, 149.

4. Narrative

Operation BERTRAM, the deception plan, preceded the main attack. Security of all types worked well, due to diligent execution of imaginative plans and ruthless watchfulness of security leaks and careless radio traffic.

The British barrage, involving around eight hundred guns, began firing at 2140 hours on 23 October, 1943. Operation LIGHTFOOT saw a methodical advance of four divisions abreast behind the carefully timed artillery barrage. The engineers, though diligent and brave, could not clear the lanes fast enough, since most of their effort was by hand. Armor displayed an amazing reluctance to move forward and the overall attack failed to penetrate the entire defensive zone. General Stumme, in overall Axis command, died of a heart attack trying to avoid enemy fire while on a forward reconnaissance. The British artillery seriously hampered wire communications and deprived the Germans of a clear picture of the battle.

Fighting continued with the Australian 9th Infantry Division doing the most in reducing Axis positions. The attacks occurred inside the defensive fortified position because the attack never fully penetrated the defensive network. Churchill allegedly exclaimed, "Is it really impossible to find a General who can win a battle?". Once Rommel returned, the Germans counterattacked throughout the 27th and 28th, but attrition favored the British. Air superiority also played a major role in breaking up Axis counterattacks.

Operation SUPERCHARGE began on the night of 1 November. The 9th Division attacked north and reached the sea, cutting off some defenders. The New Zealanders and armor broke through westward. On 4 November, following intervention by Hitler which delayed the withdrawal for a critical day, Rommel began withdrawing his mobile units westward. Many

forces, cut off, surrendered, although some intrepid officers lead their men out and escaped. Montgomery, with good intelligence of the crippled nature of the enemy, and knowing that the TORCH landings in the west were four days away,[44] chose not to pursue aggressively and avoided any chance of ruining his reputation as a great General. The British/Commonwealth forces lost about 13,500 casualties in advancing the front ten miles in twelve days. Of course, the Axis lost much more (various authors give much different numbers of Axis losses) because of the many men captured. Although the attackers clearly won a large scale victory, they did not win by defeating the enemy sheltered within the fortified positions. Without the massive numerical superiority in men and machines, the British probably would have lost because of their failure to overcome the obstacles rapidly and their laggard reduction of enemy defended localities. Thus, although El Alamein stands as a famous victory, overwhelming numerical superiority won, rather than skillful tactics. The military student learns from this battle more techniques that he should not use than techniques to emulate.

5. Use of Intelligence/Patrolling

The British had some excellent sources of intelligence before the battle. Besides Ultra as a source, detailed tactical information came from the Army Air Photograph Interpretation Unit.

> ...Enemy forethought, however, enabled many of the inner minefields to be hidden from the...interpreters. These fields were laid chiefly where the low "camel-thorn" scrub was thickest and presented on air photographs a mottled pattern that hid the disturbance of the surface.[45]

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[44] For the narrative of the overall battle, see Young, Dictionary of Battles, 456-457, Salmaggi, 2194 Days of War, 302-313, and Maughan, Tobruk, 639-745.

[45] Maughan, Tobruk, 643.

Patrols, however, did not penetrate the defenses. With no confirmation of the air reconnaissance, planners assumed the information gathered was complete, and did not take any other measures to confirm or deny their assumptions. Thus, the British based a large part of their plan on breaking through the initial outpost line and then advancing against little or no resistance.

The best information came from the "Y" Service. This electronic intelligence gathering unit gave continuous information in what is now referred to as "near real time."

> Monitoring the actual battlefield conversation of German staffs and commanders, fixing enemy locations by direction finding, and assessing the movements of units by a study of their callsigns and the changing volume of their radio traffic, "Y" Service provided an extraordinary awareness of what was going on beyond the dividing minefields. (Rommel's similar capability had been drastically reduced by the capture of his intercept unit during the July fighting. Moreover, the documents then acquired taught the British much about their own lack of radio security and led to a marked improvement.) Apart from the many tactical moves during the twelveday's fighting Rommel made only two of major significance-the transfer of 21 Panzer Division from the south to the north of his line and his commitment during the latter stages of his last reserve, 90 Light Division...Each of these...was known...through "Y" Service...[46]

Indeed, with the amount of excellent intelligence available to the attackers, the plan does not seem to have been based upon this information. The broad front, timed advance sounds uncomfortably like the Somme in 1916. Intelligence drove no special tactics or plans for reducing obstacles and defensive positions.

6. Use of Obscuration/Smoke

The attackers used darkness to conceal themselves. The bombardment raised a large quantity of dust which cloaked and also confused the British. Vehicular columns, Scorpion mine

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[46] Lewin, Ultra, 267.

clearing flail tanks and explosions from German artillery and mines reduced visibility across much of the area to a matter of feet.[47]

Smoke is mentioned in this battle only twice. On 31 October, German light tanks put down smoke to cover their advance in a small, local counterattack. During the battle, Germans also fired smoke at minefield gaps to silhouette emerging British tanks for easier targeting.[48]

The choice of a night attack to give infantry and engineers concealment and moonlight to work by, proved very sensible. Unfortunately, no one thought that during the day some other form of cloaking might be called for. The battle occurred in late October, and personal accounts mention the cold after the sun went down. These conditions favored the use of smoke for obscuration during the early morning chill, before the day's heat made dense smoke concentrations far more difficult to achieve. Since the British knew that a defensive gun line could butcher exposed tanks, the lack of smoke planning seems inexplicable. The enormous material advantage held by the attacker would refute any assumption that a choice had to be made in favor of high explosive rather than smoke.

7. Tank/Infantry Cooperation

Tank-infantry teamwork can be described, overall, only as very poor. There are very few indications of any real planning for close cooperation. Writers stress the constant rehearsals and

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[47] For many first hand accounts describing the difficulties of functioning in the choking dust see Lucas, War In The Desert, pp. 150, 165, 171, and 173. Also see Major-General G.L. Verney, The Desert Rats: The History of the 7th Armoured Division 1938 to 1945, (London: Hutchinson, 1954), 134.

[48] Maughan, Tobruk, 721, and Lucas, War In The Desert, 199.

claim success. But, in practice, the infantry went in alone and any tanks directed to give direct support fell behind waiting for the engineers to clear mines.

Since the Germans and Italians planted far more antitank mines (ninety seven percent of the total)[49] than antipersonnel mines, infantry could go through the belts without grievous losses. Some minebelts did contain buried artillery shells with trip wires and other antipersonnel mines, but not many. Note, for example, the following description of the situation:

"As the antitank mines were...in the largest numbers, the infantry were expected to take their chance...The marching men were expected to keep marching.[50]

One of the truly unforgettable occurrences in this battle concerns the British "navigating officers." With land navigation clearly a problem, each unit had a number of officers who walked ahead with a compass on a certain azimuth and counting off paces for distance. Sergeants with them unrolled white tape to mark the center of unit movement for follow on forces. One battalion lost seven killed or wounded the first night.[51] Since these officers preceded even the engineer guide parties, one can only admire their nerve and hope to never have such a task.

The infantry led the way across the mines and tried to "lean-on" the barrage as closely as possible. Many units actually passed into or through friendly fire.[52] The slow pace of the

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[49] Antipersonnel mines comprised three percent of the total mines laid. See Stolfi, Mine and Countermine Warfare, 41.

[50] Fred Majdalany, The Battle of El Alamein: Fortress In The Sand, (New York: J.B. Lippincott, 1965), 84.

[51] Majdalany, Battle, 85.

[52] See Lucas, War In The Desert, 161-169. He describes several units moving through their own fire or pausing to wait for the fire to move forward. The units that did this tended to be the high quality Commonwealth units, although no Allied infantry units

advance, and lack of lateral communication between leading infantry units and follow on armor units unhinged the entire plan. When the infantry did not make the rapid gains Montgomery ordered, the entire plan went awry. The German defenders apparently did not understand their role and fought well instead of surrendering or idly watching. The engineers could not clear lanes until the infantry silenced nearby defenders, and the tankers simply sat or inched forward slowly in tight columns waiting for the lanes to be cleared. No plan existed for the infantry or engineers to notify tank officers of problems in a timely manner to avoid bunching up.

> The cleared track was only eight yards wide, and vehicles could not pass each other...Nor could tanks turn around...The 1st Armoured Division was stuck in its corridor, and was not on its objective.[53]

Incredibly, the armored units apparently sat in the lanes in three vehicular columns side by side in an eight yard wide gap, bunched up behind the engineer teams. In daylight, the Axis artillery would exploit this to the full, as would direct fire according to local tactical conditions.

The British plan did take traffic control into account, but could not handle these unexpected problems at the front edge of the battle. Problems there needed to be handled by the junior leaders present. These leaders, very busy fighting and, in many cases, dying, could not do it all. No previous battle had seen such dense obstacles and even good men could not anticipate everything. Unfortunately, these leading soldiers discovered many lessons the hard way. One contributing factor, though, was lack of coordination among branches, so that different combat arms operated in isolation. In all the sources examined, the author could find only one real

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in this battle performed less than admirably.

[53] Lucas, War In The Desert, 184.

example of good tank-infantry cooperation. Within the sector of the 20th Brigade, 9th Australian Division, the attack failed to reach its final objectives and the infantry dug in as dawn approached. Tanks from the 40th Royal Tank Regiment managed to get forward to help out. The infantry pointed out enemy defenses and the tanks destroyed them.[54] Defensive positions usually did not have the firepower to hold off tanks, and armor could easily subdue such defenders to save infantry lives.

8. Engineers

The Engineers made prodigious efforts during this operation, especially on the first night. An idea of the scale can be seen by,

> ...Sappers with masses of tape (130 miles of it would be unrolled in the battle), posts and lamps (more than 50,000 were used to illuminate the minefield gaps) and with detectors (there were 500 brought together for the operation).[55]

Some flail tanks saw action but had mixed success. Barbed wire tangled the flail chains and made them useless. Sapper P.W. Briant recalls that,

> All that happened was that the chains flung the mines onto the tanks and that Jerry barbed wire got caught up in the drums. Even the detectors were not much cop. So it was back to bayonets.[56]

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[54] For the one bright example of tanks assisting infantry, see Maughan, Tobruk, 671.

[55] Lucas, War In The Desert, 143.

[56] Lucas, War In The Desert, pp. 173 and 197.

Some flail tanks worked with teams of 15 men. The men followed the flail tank marking the lane with tape. If the flail broke down the men took over with detectors.[57]

While flail tanks actually detonated mines to clear a lane, the so called "Polish" mine detectors merely located mines which men then lifted by hand. After marking the mines themselves and the marked lane boundaries, the engineers went back through on crawling on their knees and feeling the ground to check the lane and then actually lift all the mines.[58]

Planners recognized the difficulties in moving up follow on forces through the many minefields. They developed the previously described elaborate clearing procedure and an Army wide marking procedure as well. The system used tape and lights to mark the lane. Vehicles quickly mangled many markers on the swept lanes. Tape and poles could easily be run over and obscured. The lights worked if not obscured by dust.

Engineers worked right up front with the infantry, but that took up all available men. Apparently, no engineers stayed back to widen lanes or check for cleared areas between belts to allow vehicles to deploy. The lack of engineers also meant little relief for the men doing very stressful work. Sapper Rowlands remembered that "My hands didn't stop shaking for nearly eight weeks." Besides clearing mines, Pioneer platoons, such as in the Black Watch (51st Highland

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[57] Sapper Sidney Morgan served in such a 'Lane Group' at Alamein. See George Forty, Desert Rats At War, (London: Ian Allen, 1975), 107. After the war, Morgan became a monk. The effect of being a Sapper on his present vocation is not described.

[58] For details of lane clearing and proofing, see Majdalany, Battle, 85-86. Maughan, Tobruk, 652, mentions the use of 'proofing vehicles', heavily sandbagged trucks which drove up and down the lane first to check for missed mines.

Division), also laid hasty protective minefields.[59] The following account gives the reader a vivid first hand sense of the life of an engineer that night,

> For Alamein we were rehearsed in mineclearing with and without, infantry cooperation. The RE recce party went in with the infantry. I felt sorry for the infantry boys. They had to walk across the minefield and take up defensive positions to keep the Jerries off while our lads got to work. Then our recce party went in to find and to fix the forward edge of the field. Our officer then decided the area that was to be gapped. Behind the recce group were the tape men who ran out the tape for the first narrow gap. This was eight feet wide. The actual width of the gap when we were finished was 24 feet, and to make sure that the width was correct two men were roped at that distance and walked on compass bearings along the swept corridor. Then came the detector party: three sweepers who worked in staggered formation. Each operator had a mate, a marker who fixed a white painted metal cone over any mine that was detected in the gap. Behind the sweepers came the three-man lifting team, who knelt down on the desert and felt around the mine to make sure that it was a 'clean' one-that is, that it didn't have trip wires running from it or a booby trap attached to it. That really was a dodgy operation ...Anyway, once the mine had been defused, it was lifted out of the ground and placed outside the marking tape. The gap markers ran out their tapes to keep pace with the lifters, pegging down the tapes into position. Working at top speed, a team could work a two.hundred yard strip in about an hour. The length of time taken was increased if we were under heavy shell fire; longer still if we were under Spandau fire; and even longer if we had casualties. Everybody moved dead slow then. Using the detectors we could stand up and operate them, but those of us who didn't have proper detectors relied upon the bayonet prodding method, although at Alamein my unit did no prodding. We had detectors and were standing all the time. There was always a little group of reserves, just in case we lost men on mines or to shell or machine gun fire. This group, only a couple of men, stayed at the gap at the edge of the field and they used to brew up for us. It was really thirsty work in a gapping operation...[60]

9. Artillery

Artillery comes across as the dominant player in this battle. This is certainly understandable considering the great similarity in style of this battle and WWI British efforts.

> This, like the great First World War battles, was a sequence of sub-battles, each with an elaborate fire-plan using two or three hundred guns...Attempts on

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[59] Lucas, War In The Desert, pp. 150 and 165.

[60] Lucas, War In The Desert, 118.

> the part of the artillery commanders of armoured divisions to dissent from centralized control were firmly suppressed.[61]

Since Axis artillery posed the greatest initial threat, it became the priority target. British gunners needed darkness to spot the muzzle flashes for counterbattery fire, so the Gunners defined H-Hour. Fires massed on counterbattery missions first and then shifted to strongpoints. Planners chose twenty five enemy batteries as the most critical and massed concentrations of between 10:1 and 20:1 upon them. The counterbattery caused heavy initial losses among gun crews, according to early prisoners taken. Unfortunately, the counterbattery did not fully succeed, and defensive artillery concentrations caused some significant losses to advancing infantry, such as the Gordon Highlanders who had to repeatedly reorganize depleted units. A few accounts show short artillery rounds hitting friendly troops and there is no way to know if fratricide was a significant problem. No evidence indicates that the problem was significant. The Axis defensive fire did its damage later in the night after friendly artillery shifted fires to the rolling barrage or was answering calls for fire. No mention exists of a return to counterbattery missions.

Fire fell on Axis guns for fifteen minutes, then paused for five minutes before hitting defensive positions. The barrage severed German wire communications so that commanders had to go forward not to confirm or clarify knowledge, but to get any idea of the fight at all. The German *Panzerarmee* War Diary confirms a dearth of incoming information.

Gunners fired about six hundred rounds per gun that night. The firing had pauses built in partly to rest the guns and allow them to cool a bit to help prevent rounds exploding in the gun. The troops in their positions fought out their own private little wars in a swirling universe of dust,

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[61] Bidwell, Firepower, 278-279.

noise and confusion. Higher officers could do little but wait and hope. As the fighting continued past midnight, few noticed that it became 24 October, the feast of St. Raphael, the patron saint of pilgrims and crusaders.

E.M. Scott, a New Zealand infantryman, wrote home that "The desert was pockmarked every few feet with shell holes; his wire was blown to bits...his front line defenses were clear..." No sources mention the effect of the artillery on the mines themselves, if any. Infantry tried to stay two hundred yards behind its own barrage, to take advantage of its fire effectiveness and hit defenders still groggy from the shelling.[62]

10. Air Support

The British did not use air support to assist the fight within the fortified position. No accounts of this battle refer to any control parties forward to direct tactical air support.[63] Air strikes concentrated on supply lines and tank concentrations to forestall counterattacks. Defensive air played a role as well. On 27 October, Allied fighters drove off a *Stuka* attack. On the 25th, Allied bombers hit armored concentrations. By the 4th of November, Axis aircraft could no longer use their cratered runways to even try to intervene.[64]

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[62] For details of the barrage, see Lucas, War In The Desert, 110-164. One item of note is a passing reference that Gunners set their rounds to explode on impact. If this was true in all cases, then the British used no delay fuzes to penetrate dugouts and other positions.

[63] The British were working on such a system, but it was not ready for El Alamein. In the following March, when Montgomery's men attacked the Mareth Line in Tunisia, Forward Air Controllers (FACs), enjoyed success striking retreating Axis forces. See Bidwell, Firepower, 270-272.

[64] For details on the air war, see Argyle, Chronology, 110.

11. C2

The infantry and sappers conducted intensive rehearsals against mock defenses and minefields. Commanders at almost all levels gave briefings over sand tables. This gave rise to a general feeling of confidence, at least within the infantry. Men frequently commented during the battle that it was just like an exercise.[65]

Symbols marked the lanes for movement up to the battle for the 9th Australian Division. By using the names Diamond, Boomerang, Double Bar and Square, lighted signs with these symbols cut out eliminated confusion at night.[66] One Scottish unit named each known enemy strongpoint in its sector for a town in its recruiting area.[67] Such simplicity made things very clear. Planners named known minefields.[68] This also provided clarity in reporting and issuing orders.

Visual signals played a key role in command and control. Bofors tracer round fired every few minutes marked unit boundaries. One unit fired a certain color flare to tell all its own men rapidly that they were on the objective and should begin digging in. Two large searchlights in the rear shown in a large 'V' to aid navigation, and swept back and forth when the barrage was about to move to the next phase.[69]

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[65] Maughan, Tobruk, 653-654.

[66] Maughan, Tobruk, 650, and Lucas, War In The Desert, 150.

[67] Lucas, War In The Desert, 158.

[68] For details on minefields such as "January" and "February", see Forty, Desert Rats, 162, and Lucas, War In The Desert, 188.

[69] For details of visual signals, see Maughan, Tobruk, 653-666, and Lucas, War In The Desert, 187.

Military Police controlled traffic at minefield gaps.[70] The vehicles of the attacking British infantry moving up to resupply troops and evacuate wounded as well as the Armored Divisions needed to get forward. Artillery fire necessitated holding vehicles up to avoid needless losses in lanes covered by fire. Military police doing such tasks freed up combat troops for the attack.[71]

12. Special Weapons/Unique Employment of Assets

New equipment, such as the Flail tank and the small number of Sherman tanks freshly arrived, failed to live up to expectations. The British had no good means of rapidly clearing lanes through mines, and this cost them dearly. Flail tanks could only move forward at a speed of one and one-half miles per hour while flailing. With the spinning chains and cloud of dust, these tanks could not use their own weapons.[72] As noted earlier, the flails themselves were vulnerable and not universally effective.

13. Historical Lessons

This battle showed a need for a mechanical means of rapidly breaching thick minefields, and for clearly marking them. Engineers did not work throughout the depth of the penetration, so follow on units could not fully disperse. Engineers should be echeloned throughout the depth of the attack to widen lanes and clear areas within the fortified position, or verify that an area is already clear, so that follow on combat forces, artillery units, and others may spread out. If this

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[70] Lucas, War In The Desert, 144.

[71] Maughan, Tobruk, 666.

[72] Kenneth Macksey and John H. Batchelor, Tank: A History of the Armoured Fighting Vehicle, (New York: Charles Scribner's Sons, 1970), 140.

widening is not done, the whole attacking force may find itself strung out on a few cleared paths, a potential highway to hell. Multiple lanes need to be cleared for each unit, so that existing units and passing units can have different lanes for traffic going different ways, since walking wounded who can escort prisoners will be moving rearward.

The infantry needed weapons light enough to carry, yet powerful enough to help reduce entrenched defenders. Infantry had light machine guns and grenades, but no accounts mention flame weapons or light mortars. Tanks normally filled this support role, but mines channeled their movement and rendered them virtually useless. Without the advantages normally given by tanks, the Commonwealth and British infantry did minimize losses by leaning closely on the barrage to get on top of defenders quickly. Unfortunately, an inflexible rolling barrage will not allow shifting of fires if the infantry cannot keep up. This battle showed the cost of narrow mindedness among combat branches. If infantry must go virtually alone, infiltration tactics should be used. Such tactics did well in the First World War and might have succeeded more effectively in this First World War style fight. The change in thinking required by such tactics, however, proved to be beyond British forces of the period.

Units encountered many minebelts not previously known. A system of naming obstacle belts would assist command and control of forces. Units, for example, could name the first minebelt M2 and other known ones in order of M10, M20, etc. As units encounter new, or odd, obstacles, these could be named M3, M5 and so forth.[73]

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[73] For the basis of this idea see Lieutenant Colonel Thomas V. Morley and Captain Anthony J. Tata, "Passing Through The Eye Of A Needle: Breach and Defile Operations," Armor, July-August 1989, 26-32.

Intelligence is only as good the use commanders and staffs put it to. Intelligence also must be confirmed, preferably by scouts using direct observation. The composition of obstacles is key to developing a plan of operations, and physical scouting is best for this.

Counterbattery fire must continue throughout the battle to be really effective. The fifteen minutes on enemy batteries should probably have been lengthened. Fire should pinpoint known positions to avoid wasting shells on empty desert just to have a rolling barrage. Some batteries should remain free for opportunity fire on newly discovered positions. The barrage at El Alamein seems far to rigid to have allowed this.

B. OPERATION GOODWOOD: DEATH RIDE OF THE ARMOURED DIVISIONS[74]

> Monty built up 8 Corps under Dick O'Connor trying to break through. Then he had a terrible press conference...Bloody stupid communique he read to them. We hadn't advanced an inch. That night Dietrich smashed a bunch of our tanks.[75]

With the North African and Italian experience behind them, the British in the Normandy bridgehead faced off against the 1st *SS Panzer Corps* and a portion of LXXXVI Corps around Caen. This examination of the GOODWOOD attack will show that the British still had significant problems attacking a fortified position, even one smaller and in some ways weaker than the one at El Alamein.

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[74] Alexander McKee, Caen: Anvil of Victory, quoted in Carlos D'Este, Decision In Normandy, (New York: E.P. Dutton, 1983), 385.

[75] Brigadier Williams, quoted in D'Este, Decision, 392. While the General's comments are not exactly accurate, they do effectively convey the feelings of most people about the GOODWOOD debacle.

1. Terrain: A Stamping Ground for Armour

The terrain chosen for the attack covered a box roughly eighteen square miles in size. This box stretches three miles east to west and six miles north to south and lies east and southeast of the city of Caen. This area is open, rolling ground covered with small farming villages which lay in a checkerboard pattern throughout, each lying about one mile from each of its neighbors. Each of these villages, centered on a solidly built manorial farm, lies within thick orchards. The overall plain, free of hedgerows and streams, leads to larger open ground to the southeast and is bordered by industrial urban areas around Caen to the west and pastoral wooded high ground to the east. Besides the villages, the most significant features are two railway lines, some portions of which are on embankments, which cut across the battlefield running east to west.

Another decisive factor was the area the British chose as their assembly area. The 6th Airborne Division held a salient across the Orne River northeast of Caen. To attack southward into the open terrain, the British had to cross a parallel canal and river to mass inside this salient and push southward. The bridges and area would limit the ability to mass. Since the Germans held higher ground that allowed observation of this salient, surprise relied on not massing too soon.[76]

> An attack down the corridor was not therefore to be a stretch of easy motoring but a complex navigation between strongpoints, overlooked at a distance by commanding heights, natural or man-made, still in enemy hands.[77]

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[76] For details on terrain and Montgomery's "stamping ground" comments, see D'Este, Decision, 359, and John Keegan, Six Armies In Normandy, (New York: Viking, 1982), 191-193.

[77] Keegan, Six Armies, 193.

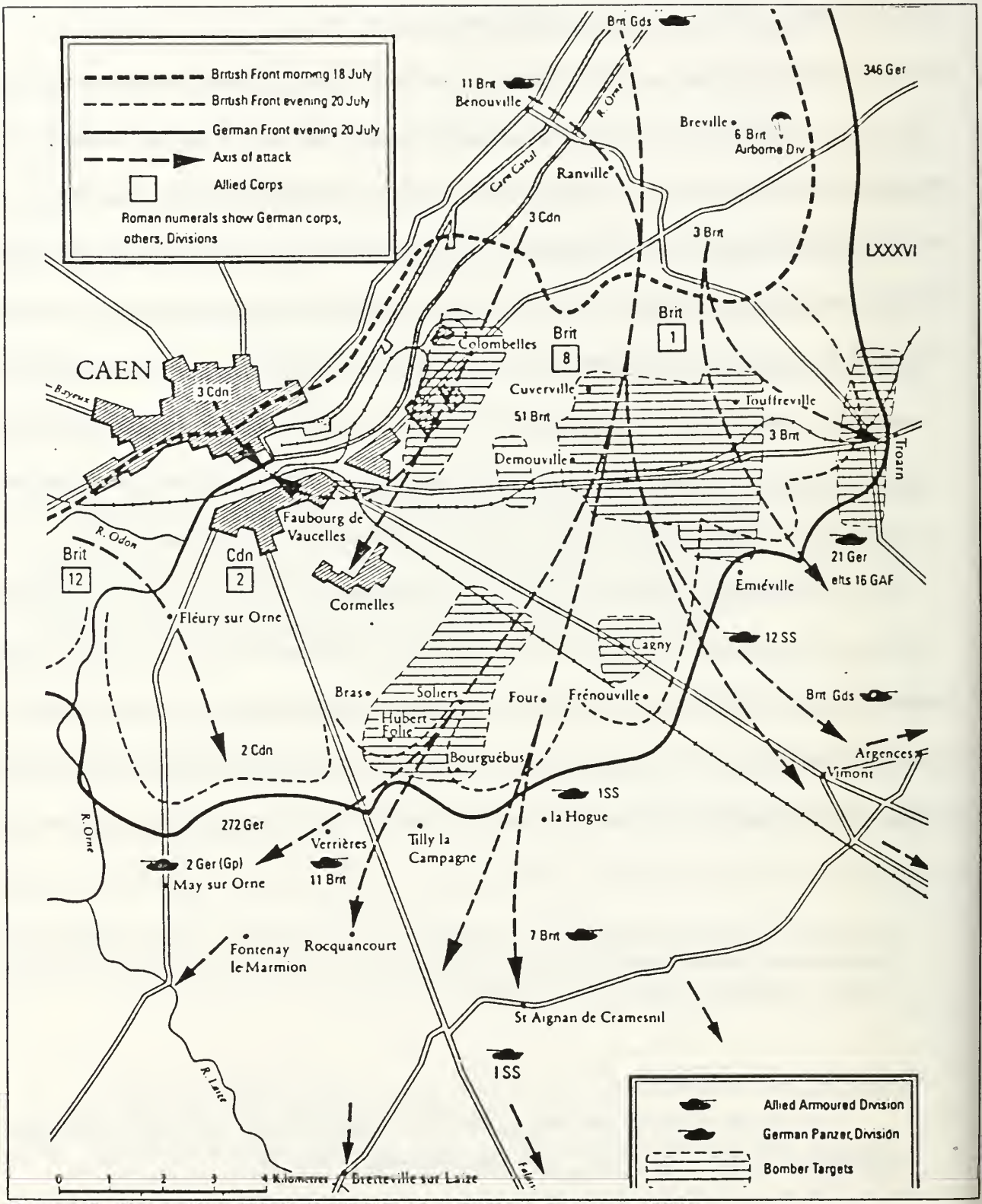

Figure 2: Operation GOODWOOD (See D'Este, Decision, 384)

2. Defenders

The Germans under General Heinrich Eberbach, commander of *Panzer Group West*, arrayed themselves in four defensive belts ten miles in depth. The reserve counterattack force comprised a Panther equipped battalion from the 1st *SS Panzer Division (Leibstandarte Adolf Hitler)* and two battle groups of infantry and Tiger tanks from the 12th *SS Panzer Division (Hitler Jugend)*. Within the defensive belts, the Germans positioned two infantry divisions in the first belt and two *panzer grenadier* regiments of the 21st *Panzer Division* occupied the second belt. The series of twelve villages previously mentioned, each garrisoned with an infantry company equipped with three or four antitank guns and six-barreled *Nebelwerfer* mortars, made up the third belt. This author could not clearly ascertain the units in the fourth belt, and the counterattack force waited behind all the belts. Within this entire fortified position, but not directly under ground commanders, lay approximately eighty 88mm dual-purpose guns controlled by the 3rd *Luftwaffe Flak Corps*.[78]

Of even greater significance than the numbers was the quality of the defenders. These units were some of the very best that Germany could field. These men considered themselves Germans first and secondly as soldiers who owed loyalty to each other. Counterattack was the basic defense and the loyalty to other soldiers enabled different troops to rapidly coalesce into "battle groups", or *kampfgruppen*.[79] Although Rommel had been seriously wounded by British

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[78] For information regarding the *Luftwaffe* units in the area and British intelligence regarding German dispositions, see Lewin, Ultra, 330-334.

[79] Bidwell, Firepower, 216. Bidwell provides an excellent concise description of the intangible quality which played such a key role in German battlefield success.

fighter-bombers on the 17th of July, these Germans knew what to do and did not need guidance from higher officers. Arguably, the most significant individual facing the British that day was *Oberst* (Colonel) Hans von Luck. He commanded a Battle Group of the 21st *Panzer* on the eastern portion of the battlefield. At 33 years of age, he was already a veteran of the Polish, French, Russian and North African campaigns. While obviously not all defenders rivalled Luck, many were not too different, and Luck will appear again in the narrative portion.[80]

3. Attackers: On The Threshold of Great Events[81]

As before El Alamein, pressure mounted on the British to attack. Montgomery, now commanding all British ground forces, knew that Eisenhower and Churchill were losing faith in him after his slow movements since D-Day. Also, the strongest German forces lay opposite the British and continued inaction would allow the Germans to deploy more strength against the Americans in the south, who were about to try a breakthrough. Finally, British infantry losses could no longer be replaced. The superb Commonwealth units had gone home to fight the Japanese. The British had reached the bottom of the barrel and would soon start disbanding units for fillers. Tanks, however, existed in plenty and more could always be made.[82]

This attack into the Caen-Falaise plain would allow the British to fully use the 2,250 medium and 400 light tanks ashore. A large strike by bomber command on German strongpoints,

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[80] For succinct descriptions of the German defenses, see D'Este, Decision, 368-377,Keegan, Six Armies, 211-213, and English, Infantry, 142.

[81] Lieutenant Roden Orde of the 2nd Household Cavalry Regiment, on the eve of GOODWOOD, quoted by Keegan, Six Armies, 193.

[82] For an understanding of the pressure to attack, see Keegan, Six Armies, 189-193.

combined with the tank strength, would preserve the scarce infantry. The plan called for the three armored divisions, the 7th, the 11th and the Guards, to assemble in the small bridgehead across the Orne and breakout southward immediately following the bombing strikes. General Dempsey, the actual author of the plan, anticipated that a rapid advance on the heels of the shock from the bombing would cut through the defenders and gain the open country towards Falaise. Additionally, units on either flank would launch supporting attacks and the Canadians would finish taking Caen, or what was left of it.[83]

4. Narrative

As the day dawned bright and clear on the 18th of July, 1944, hundreds of bombers roared in at 0530 hours and hammered the German defenders. The air forces kept their bargain and dropped nearly 10,800,000 pounds of bombs into their target areas. The strike, in three waves, continued until after 0830 hours. Artillery and naval gunfire followed with a quarter of a million rounds. This horrific pounding buried men and equipment, drove desperate men to suicide, and left those men who lived and maintained coherence desperately digging out weapons clogged with dirt to meet the attack they knew would follow. It would be a question of how fast the attackers followed up.

At 0730, the first British armor obeyed the "Move Now" in their earphones and drove forward through the lanes in the friendly minefields. Immediately, the advance began to string out as the first tanks followed the rolling barrage and those in the rear could not deploy rapidly enough to keep up. The advance continued but soon the defenders lucky enough to escape the worst

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[83] The overview of the tactical plan is paraphrased from D'Este, Decision, 354-359.

shelling opened fire. Artillery, constrained to the west side of the Orne river, reached the limit of its range. The attack continued as a finger, rather than a mailed fist for two terrible reasons. First, the limited assembly area meant most of the armor had to cross the bridges over the Orne canal and river (basically three routes). Then vehicles had to pass through the lanes of a British minefield, through which the engineers had not been able to clear the desired number of lanes. About 1100 hours, the Germans announced that they still considered that section of France to belong to them and defensive fire began to exact its toll. Many tanks came to ruin trying to get through the few underpasses of the railroad embankments, which the defenders covered with direct fire. By 1430 hours, the reserve from the *Leibstandarte* had moved up into sunken lanes and trees to await the British moving up the slopes toward them.

The massive traffic jams at the bridges put units such as the 7th Armoured Division hours behind schedule. The 7th had the mission to screen the British left (the eastern side of the box) and its absence gave the German Tiger tanks around Emieville the chance to counterattack into troops who thought their flanks were protected.

As the British tanks advanced, scattered Germans resisted. *Oberst* Von Luck of the 21st *Panzer*, who had just returned from leave as the bombardment finished, scraped up the tanks and guns he could find to fight. When a *Luftwaffe* officer stated that his untouched 88mm guns were to fire against aircraft only, Luck drew his pistol and the officer reevaluated his engagement criteria.[84]

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[84] This incident is recounted by D'Este, Decision, 375, and Keegan, Six Armies, 206.

As the tanks penetrated into the fortified villages, defenders hit them from all sides. Most antitank weapons faced to the rear of the villages. Tank crewmen tended to orient only forward and with the armor thin in the rear of the tanks, many vehicles fell victim to German gunners.[85]

By the end of the day, the attack had shot its bolt. British tanks could not match German tanks in gun duels. Nearly two hundred British tanks were destroyed or damaged and fifteen hundred infantrymen also were casualties. The fighting continued for two more days for no significant change, and building to a final casualty list of over 5500 men. The Canadians took all of Caen and the Germans suffered severe losses -- approximately 109 tanks and half their antitank guns -- that they could ill afford. The attack failed to break through, but did keep pressure off the Americans preparing their own major attack.[86]

5. Use of Intelligence/Patrolling

Ultra provided some very detailed information, including divisional boundaries and approximate locations of the 88mm guns opposite the British.[87] Since the stabilized front allowed use of wire communications, electronic intelligence gathering suffered. No published sources this author checked mentioned any ground reconnaissance before the attack. Some occurred in the

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[85] This all-around defense information comes from a lecture given by the British Liaison Officer at the U.S. Army Armor School at Fort Knox, KY, to the author's Armor Officer Advanced Course Class in October, 1986.

[86] Details of the battle come primarily from D'Este, Decision, 369-385, and Keegan, Six Armies, 200-219.

[87] See Lewin, Ultra, 330-334. The Luftwaffe was very good about sending in updates on strength and position by radio.

sectors where units held the line, of course, but no deep patrols probed the defensive belts. Scouts went in mounted just ahead of the other tanks.[88]

6. Obscuration/Smoke

The large concentrations of high explosive aerial bombs raised enormous quantities of dust and dirt within the impact areas. This obscuration made little contribution to the attackers, since any defenders that it might have screened were more effected by the blast and concussion. The dust and smoke dissipated rapidly enough so that other defenders not suffering from the bombardment lost little effectiveness from it. No accounts mention the use of screening smoke from the artillery, although the units certainly needed it at the railway embankments.

7. Tank/Infantry Cooperation

This battle saw the virtual reverse of this relationship as it existed at El Alamein. In GOODWOOD, the armor raced forth in splendid isolation from all other supporting arms. The infantry, engaged in slowly clearing out built up areas close to the start line, never could give much assistance. The British also had chosen not to mount their infantry in armored carriers,[89] so it could not have moved rapidly with the tanks unless it rode on the tanks themselves. Much of the blame lies in orders by Montgomery that first priority go to securing the flanks of the attack. This forced early commitment of the infantry to the "dog-fight" of clearing parts of Caen and

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[88] See Keegan, Six Armies, 203-204. This point was stressed in the lecture to the author, as well.

[89] General O'Connor, the 8th Corps commander, had ordered that a number of self-propelled armored gun carriers be transferred from the artillery to the infantry to become armored personnel carriers. His unorthodox actions met howling and wailing. General Dempsey, the 2nd Army commander ordered him to reverse the decision. The infantry would move by foot or truck. See D'Este, Decision, 389.

several fortified villages.[90] Infantry could have done well against the German armor in the sunken roads and wooded areas where fighting took place later in the day. Tanks could also do little against the guns within the fortified villages.

8. Engineers

Since the German defenses relied on direct fire, and had not the time nor resources to sow thick minefields, British engineers did not play the major role they had at El Alamein. They did not accompany the tanks forward and their greatest challenge was from a friendly minefield.

> Up to three nights before GOODWOOD the 51st Division had been told to hold defensively...the mines had been laid over a ten day period...both anti-personnel and anti-tank mines; the area had been heavily shelled, resulting in some being detonated, buried or displaced...it was futile; the best that could be done was to clear fourteen gaps the width of a tank plus ten yards on either side, with three more being added at the last moment.[91]

Engineers should have been forward in some strength to blow gaps in the railway embankments. This would have required significant amounts of explosives, or infiltration the night before to begin manual reduction. None of these options was practical within the given scheme of attack.

9. Artillery

Artillery lent significant support to the attack within the limits of the gun ranges. Since the artillery had to stay on the west side of the river, it could not fire throughout the sector. The traffic bottleneck kept it from moving up. This made the air support essential to replace the artillery support.

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[90] For a discussion of Montgomery's caution and directives to O'Connor regarding priorities, see D'Este, Decision, 373-389.

[91] Major Geoffrey Galloway, Commander Royal Engineers, 51st Division, quoted in D'Este, Decision, 366.

Comments by Field Marshal Lord Carver, then a lower ranking 4th Armoured Brigade commander,give some excellent ideas on artillery employment and the basic weaknesses of British tactics. While his comments do not directly relate to the artillery use in GOODWOOD, they are very useful as an alternative technique.

> The failure of our tactics...to deal with the German layout of defense was one of the reasons for everything coming to a halt so soon. Our plans so often laid on an immense fire-plan to carry the leading battalions about 1,000 yards into the enemy position. In fact, as the Germans were always prepared to sacrifice their first line, not very strongly held, but strongly enough to demand a proper attack, including mineclearing, this attack came to a halt just on their main position. The immense fire-plan gave them warning and the time to move up...tanks and SP anti-tank guns..."

Carver states that he argued to,

> ...get them to design the fire-plan to deal with the anti-tank gun defence primarily, leaving it up to the tanks to get the infantry up. This involved a fire-plan in much greater depth and no preliminary bombardment or barrage for the infantry. I was never successful...[92]

10. Air Support

For an operation planned and executed within forty hours, the air support of GOODWOOD stands up well to examination. The strikes hit on time and on target. Planners used delay fuzes to penetrate dugouts in some areas and percussion bombs to avoid cratering in others to facilitate friendly movement. The target areas contained most of the fortified villages and other obvious targets. Almost the only flaw was that the ground forces could not possibly move rapidly in enough force to fully exploit the strikes because of the monumental traffic jams at the bridges and the minefield.

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[92] Lord Carver's comments are quoted in D'Este, Decision, 290.

attacks, although since many of them "brewed-up" along with other tanks some targets avoided air attack. This close air support is critical, although sketchy accounts make evaluation of its effectiveness here difficult. General O'Connor, 8th Corps commander requested another large bombing strike by the "heavies" later in the day to rejuvenate the attack, but such an operation could not be mounted so quickly.[93]

11. C2

The major failure in this attack came from not massing and following the bombardment rapidly enough. If not for the poor choice of jumping-off sites which created a host of critical problems, GOODWOOD could have been an excellent example of how to assault a fortified position. Planners provided the portable firepower along with means to flexibly control it (FACs). The comments by Lord Carver sum up relevant factors as well as this author can.

12. Special Weapons/Unique Employment of Assets

Diverting heavy bombers from the strategic role paid dividends. The units directly struck suffered horribly and the technique enables massive force to be concentrated. Unfortunately, no good means of controlling the strikes existed to fully utilize the capabilities. Also, no follow on strikes occurred deeper in the sector. Air power such as this offers a tantalizing glimpse of what could be possible if proper control mechanisms can be combined with flexible thinking. There is no firepower more portable than that which is mounted on an aircraft. It could validate the

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[93] Information on air support comes from D'Este, Decision, 379. Keegan, Six Armies, 212-213, relates the story of a forward ground controller with the 23rd Hussars who tried to use the BBC frequency to get a request through after his tank was destroyed.

concept that "fire-power...could be concentrated to such a degree that it was possible to burst through any purely static defensive system and then keep on attacking and advancing."[94]

13. Historical Lessons

The British "...did not plan GOODWOOD as the breakout but...hoped that a breakthrough might result."[95] The plan covered the close in enemy, but did not really plan for success. A full breakthrough would need infantry, if not to make it happen, at least to consolidate and hold gains. It is not too far fetched to agree with the opinion that,

> Unquestionably, Operation "Goodwood" failed for lack of sufficient British infantry, without which fortified strongpoints could not be mopped up quickly enough or German infiltrating counteractions prevented.[96]

The horrible traffic problem, which tends to be omnipresent in this type of attack, limited combat power throughout.

A force attacking through a fortified position must fight throughout the entire depth of the penetration. The Tigers which counterattacked in the east, Luck fighting with his bypassed forces, and the rearward facing antitank weapons in the villages are indicative of the confused and fluid nature of these fights. Commanders must anticipate this and allocate forces, and leaders, throughout the area to deal with these bypassed forces effectively.

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[94] Bidwell, Firepower, 216.

[95] British Directorate of Army Training, in a film about GOODWOOD, quoted in D'Este, Decision, 396.

[96] English, Infantry, 142.

This battle again showed the criticality of all branches working together to complement each other's strengths. Infantry cannot fight alone, nor can tanks. Such a mesh must occur at very low levels. Artillery or mortars must also mesh, especially to deliver responsive smoke. Good smokescreens on the flanks might have saved many tanks picked off in the open, and would have made a penetration a more likely possibility.

IV. THE GERMAN EXPERIENCE: INTO THE CAULDRON[97]

> Gentlemen, the enemy stands behind his entrenchments, armed to the teeth. We must attack him and win, or else perish. Nobody must think of getting through any other way. If you don't like this, you may resign and go home.
>
> *Frederick The Great to his officers before the battle of Leuthen, 5 December, 1757*

A. KURSK

1. Terrain

Kursk lies generally in the central region of European Russia, roughly equidistant from Moscow and the Crimea. The larger town of Orel lies to the north and Belgorod lies south. Kiev is about 250 miles slightly southeast. The town of Kursk itself lay at the base of a salient extending towards the west which remained after a previous Soviet offensive during early 1943. The terrain itself generally consists of rolling hills and large relatively flat areas. Vegetation is fairly sparse and small villages and towns lie scattered across the land. In some places, the ground changes from gently rolling into deep ravines which constrained movement in good weather and especially in bad weather. In the southern sector,

> The terrain, over which the advance was to take place, was a far-flung plain, broken by numerous valleys, small copses, irregularly laid out villages, and some rivers and brooks: of these the Pena ran with a swift current between steep banks. The ground

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[97] OKH Operations Order No. 6, dtd 15 April 1943, para 2d. Quoted by Geoffrey Jukes, Kursk: The Clash of Armour (New York: Ballantine Books, 1969), 38. Sources differ in exact wording of this order because of variances in translation, but the content is similar.

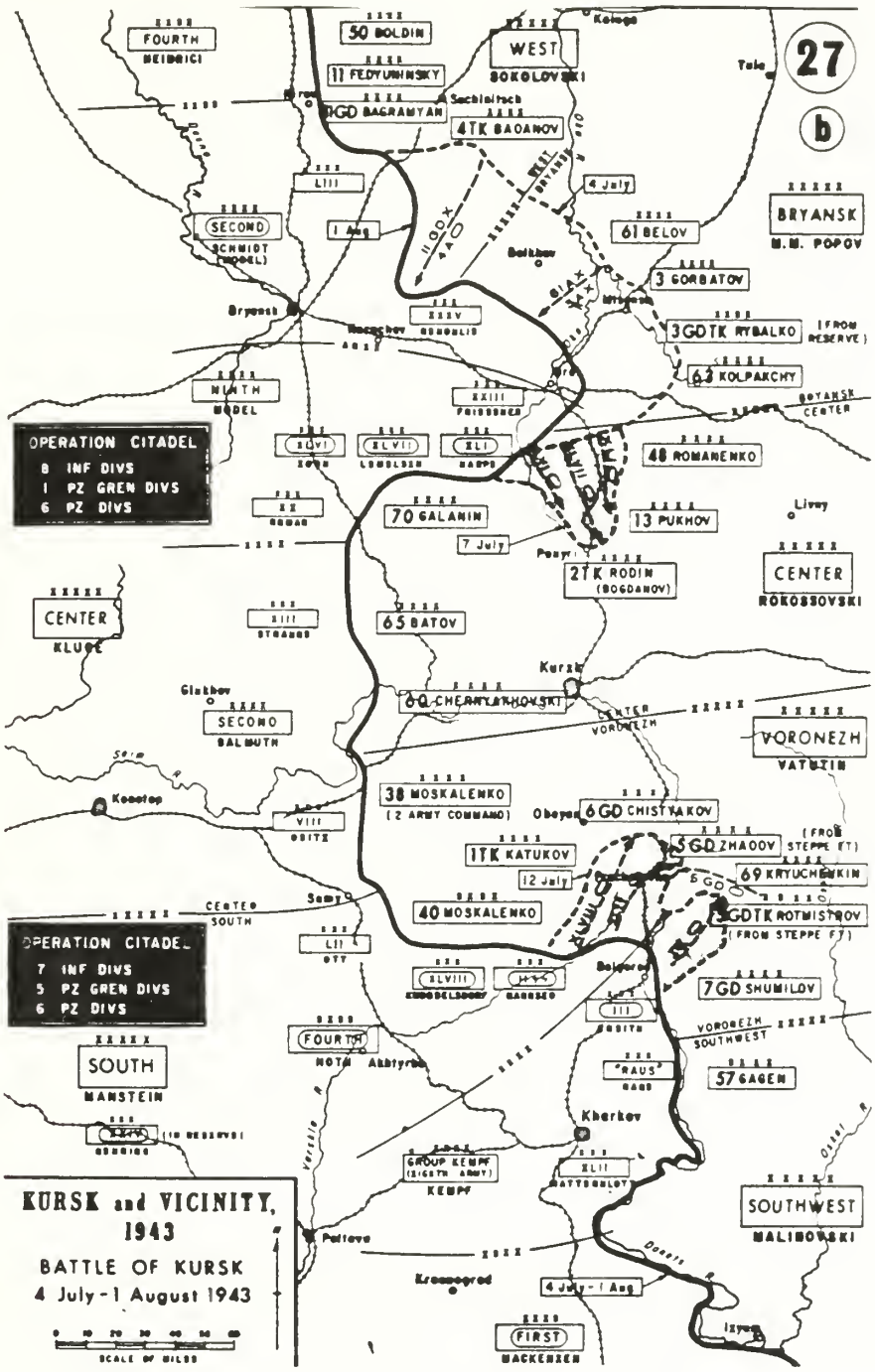

Figure 3: The Kursk Salient (See Campaign Atlas to the Second World War: Europe and the Mediterranean (West Point, NY: USMA Department of History, 1980), Map 27.)

> rose slightly to the north, thus favoring the defender. Roads consisted of tracks through the sand and became impassable for all motor transport during rain. Large cornfields covered the landscape and made visibility difficult.[98]

Thunderstorms the night of 4 July flooded streams and made these ravines virtually impassable seas of mud for a significant period.[99]

2. Defenders

The Soviets knew an attack would come against the Kursk salient and prepared the strongest fortified position in history to meet it. They planned to make history by stopping "...a German strategic offensive before it had achieved tactical or operational success."[100] By 1943, German attacks had taught the Soviets many valuable lessons concerning defensive preparations and tactics. Soviet tactical defenses assumed the nature of dense, deeply echeloned trench systems which sheltered infantry and allowed repositioning of forces and weapons. Depth replaced width as the key consideration. German armor comprised the greatest threat and the Soviets took several measures to combat it.

> Antitank strongpoints (ATSPs) and antitank regions (ATRs) integrated antitank fire and the fire of infantry and artillery cloaked within the protection of engineer defenses. The ATSPs were formed in company defensive regions and combined their fires with those of rifle company heavy weapons and antitank rifles. An

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[98] Major General Friedrich Wilhelm Von Mellenthin, Panzer Battles: A Study of the Employment of Armor in the Second World War (Norman, OK: University of Oklahoma Press, 1956), 218-219.

[99] For one of many sources mentioning the rain and the ravines, see Martin Caidin, The Tigers Are Burning (New York: Hawthorn, 1974), 165.

[100] Colonel David M. Glantz, Soviet Defensive Tactics at Kursk, July 1943, CSI Report No. 11 (Fort Leavenworth, KS: Combat Studies Institute, 1986), 25.

> ATSP normally consisted of four to six antitank guns, six to nine antitank rifles, two to three heavy machine guns, and three to four light machine guns. Troops with automatic weapons and sappers with antitank mines supported the antitank gunners of each strongpoint.[101]

Armored and self-propelled gun reserves conducted local counterattacks or deployed as firing points to bolster sectors. Mobile obstacle detachments of engineers laid hasty minefields during fighting in response to changing situations. Divisions defended frontages of six to nine kilometers in width. This meant tactical densities of "... .7 to 1.5 rifle battalions, 18 to 30 guns and mortars, and 2 to 4 tanks per kilometer of front."[102]

Detailed citation of unit strengths, guns, mines and the like overwhelms a reader with a mass of data. This author will attempt to highlight key points of the defensive works within some manageable context. Two Soviet Army Groups defended the 550 kilometer long front line of the salient itself. The Steppe Army Group deployed behind these two and gave the entire position a depth from west to east of 250 to 300 kilometers. Overall strengths of combat and support forces approached 1,910,000 men, 28,320 guns and mortars, 4930 tanks and self-propelled guns, and 2,650 aircraft. The Soviets planned to first stop the German breakthrough through attrition and then launch a major counterattack.

> In fact, Soviet planners integrated two planned counterstrokes into their strategic defensive plans. The first would occur against German forces in the Orel salient north of Kursk while the German offensive was still in progress. The second would

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[101] Glantz, Soviet Tactics, 23. Note the large number of antitank rifles, which had little effect.

[102] This description of Soviet defensive style is paraphrased from Glantz, Soviet Tactics, 12-13.

strike German forces south of Kursk once the German advance in that region had stalled.[103]

This analysis will concentrate on the portion of the southern flank defended by the XXIII Guards Rifle Corps where the decisive actions took place. Here,

> The main defensive area, about 20 kilometers deep, was arranged in two fortified zones, each five to seven kilometers deep, the two zones separated by about five kilometers. Each fortified zone contained three successive defensive positions. Each of these positions had two or three lines of trenches, as well as minefields, antitank ditches, pillboxes, bunkers, and barbed wire obstacles. The first position of the first zone probably constituted the strongest part of the main defensive area. Behind the main defensive area, for a depth of about 15 kilometers, obstacle centers were built. Covering from two to five kilometers each, these were placed in areas most vulnerable to potential German penetrations.[104]

After the third defensive line came and went, a common German comment was "Goddamn it, how many do they have?"[105]

Mines played a large role in the defense, but most accounts are very unclear and lead the reader to believe that every square foot of open Soviet soil contained a mine.

> ...an average density in the most vulnerable areas of 1,500 antitank and 2,000 antipersonnel mines per kilometer of frontage. The mines were laid six to ten meters apart in irregular rows 15 to 40 meters apart, to a depth of at least 100

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[103] Glantz, Soviet Tactics, 29.

[104] Historical Evaluation and Research Organization (HERO), The Value of Field Fortifications in Modern Warfare Volume 1. (Dunn Loring, VA: HERO, 1979), 23.

[105] First person material concerning the German combat troops at Kursk and the 2d *SS Panzer Grenadier Division Das Reich* overall comes from interviews this author conducted by phone and tape with Mr. Arnold Friesen. Mr. Friesen fought at Kursk as a 17 year old *Oberjunker* (SS Officer Candidate) Tiger tank platoon leader. Officer Candidates had to prove themselves in combat prior to commissioning. All subsequent references will be cited as Friesen, Interview and the date the topic was discussed. Thus, this citation is Friesen, Interview, 30 Nov 90 and 23 Feb 91.

> meters apart in irregular rows 15 to 40 meters apart, to a depth of at least 100 meters. A continuous antipersonnel minefield was laid in front of the first line of defense, and antitank mines and other tank obstacles were laid along segments of roads and all bridges.[106]

Thus, in the heaviest mine densities, a sector one kilometer wide by twenty kilometers deep might have an average mine density as low as one mine every 33 square yards or as high as one every 8 square yards. Even this is not quite correct, since the defenders laid the mines in certain areas and not uniformly throughout the entire defensive sector.

3. Attackers: Cold Blood and Warm Underwear[107]

Germans relied on the high quality of their leadership, especially at lower levels, and training coupled with the adaptability of their soldiers to retain the critical edge over the Soviets. In fact,

> The Germans couldn't afford **not** to train (and train well) their soldiers. All that was standing between Germany and the massive armies of Russia was a thin grey line of well trained soldiers.[108]

This reliance on training paid great rewards but exacted a high price as well.

> German units as far down as the platoon level were equipped with a multiplicity of different weapons. This gave these units much greater flexibility, although such

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[106] Historical Evaluation and Research Organization (HERO) Historical Evaluation of Barrier Effectiveness (Dunn Loring, VA: HERO, 1974), 112.

[107] The title of this section comes from a phrase Friesen's Platoon Sergeant used to describe necessary characteristics of a tank commander. Friesen, Interview, 30 Nov 90.

[108] James F. Dunnigan, The Russian Front: Germany's War in the East, 1941-1945 (London: Arms and Armour Press, 1978), 111.

> units took much longer to train and required much better educated individuals and more highly trained instructors to begin with.[109]

In the summer of 1943, the Russo-German conflict was still too close to call. On the offensive, the Germans had never really been defeated, especially in their summer offensives, but the victories alone could not guarantee overall success, and ultimately,

> The German Army would die in Russia-die of neglect in those vast open spaces that had earlier devoured other famed invading armies. Unlike other armies, however, it would not disintegrate, but rather slowly bleed to death after winning a series of spectacular mobile victories..."[110]

The fighting at Kursk actually saw the Germans break through the formidable defenses in places. This study will concentrate primarily on the 2d *SS Panzer Grenadier Division Das Reich*[111] and the southern pincer of the German offensive.

The Soviet Winter offensive of 1942-43 left the front lines in open country and gave the Germans no river line to anchor their defenses upon. The German High Command also expected the Soviets to launch another offensive later that summer out of the Kursk salient. To forestall this offensive and to gain more suitable terrain, the

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[109] Dunnigan, Russian Front, 136. One facet of this style manifested itself in selecting men for military specialties based upon civilian experience. Mechanics became either mechanics or tank drivers. Men with some electronic aptitude became radio operators. Friesen, Interview, 14 Nov 90.

[110] S.J. Lewis, Forgotten Legions: German Army Infantry Policy 1918-1941 (New York: Praeger, 1985), 128.

[111] *Das Reich* (and its sister units) was a *Panzer Grenadier* unit from November 1942 until January 1944, when it was designated a *Panzer Division*. Friesen, Interview, 5 Mar 91.

Germans decided to launch an attack aimed at pinching off the Kursk salient as soon as possible.[112]

> 1. The objective of this offensive is to encircle enemy forces deployed in the Kursk area by means of an extremely concentrated thrust conducted mercilessly and swiftly by one assault army each from the areas of Belgorod and south of Orel, to annihilate the enemy in a concentric attack. In the course of this offensive, a shortened new front which will save strength will be gained...[113]

A large part of the power of the southern pincer lay in the 2d *SS Panzer Corps* made up of three SS divisions. The 1st *SS Panzer Grenadier Division Leibstandarte Adolf Hitler (LAH)* took the left and tied in with the 48th *Panzer Corps*. The 2d *SS Panzer Grenadier Division Das Reich*, which made the deepest gains of the battle, fought in the center. On the right, 3d *SS Panzer Grenadier Division Totenkopf* tied into *Armee Abteilung* Kempf (Army Detachment Kempf), which itself formed the right flank of the German attack.

A detailed knowledge of the *Das Reich's* composition will facilitate understanding of later sections. The division took its name from the *SS Panzer Regiment #2 Das Reich*, the one tank regiment in the division. The other two regiments were *panzer grenadier* units: *Regiment Deutschland (SSD)* and *Regiment Der Feuhrer (DF)*. SS Artillery Regiment #2, one *Aufklärungs* (reconnaissance) battalion, one *Kratschützen*

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[112] General Theodor Busse, et al., "Zitadelle (Operation Citadel), Fourth Panzer Army Attack, July, 1943", in World War II German Military Studies, Volume 16, Part VII. (New York: Garland Publishing, 1979), 64.

[113] OKH Operation Order No. 6, quoted by Janusz Piekalkiewicz, Operation "Citadel": Kursk and Orel: The Greatest Tank Battle of the Second World War, transl. by Michaela Nierhaus (Novato, CA:Presidio, 1987), 41-42.

(motorcycle) battalion and one *Pioniere* (engineer) regiment made up the bulk of rest of the division. Other units of the division were the signal battalion, the antiaircraft battalion and the antitank battalion. The engineers normally broke down with one battalion to each regiment.

Each infantry regiment had 12 companies (four per battalion). Some situations saw a regiment strengthened up to 16 companies. The 13th company would be a *sturmgeschütz* (assault gun) unit. The 14th and 15th were heavy duty *SPWs (Shützen Panzer Wagon*) armored personnel carriers. The 16th might have been an engineer company. Each battalion also normally had one *Pakshützen* (antitank gun) company.

Three *abteilungs* (battalions) of four companies each comprised the *Panzer Regiment*. The 1st and the 2d battalions had Mark IVs (even some Mark IIIs in the 2d) and the 3d battalion had assault guns. This last battalion always supported the infantry. The regiment also had a 13th company of Tiger tanks.[114]

4. Narrative: The Swan-Song of the German Armored Force[115]

German planning for the offensive began in April of 1943. Originally considered for March, the start date continually slipped back. At first, the muddy conditions forced the postponement. Later, Hitler decided to delay the operation to build up tank strength and await the arrival of Panther and Tiger tanks and the *Ferdinand* or *Elephant* assault guns. The Soviets, warned both by intelligence within Germany from

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[114] Friesen, Interview, 23 Feb 91.

[115] Soviet Marshal Koniev, quoted by Mellenthin, Panzer Battles, 230.

a spy code named "Lucy" (or possibly from Ultra) and direct observation strengthened defenses. The German forces in North Africa surrendered in May and Hitler's fears of rapid Allied invasion coupled with the growing Soviet strength again forced a postponement. Finally, Hitler set 5 July, 1943 as the start date of the offensive.

In the south, Soviet occupied high ground denied the attackers good observation posts for artillery observers. To rectify this, the Germans attacked on the afternoon of 4 July to seize the limited objective of this high ground. The *Grossdeutschland Division* and the 3d *Panzer Division* did most of this fighting, aided by 800 aircraft. Soviet aircraft also made attacks against German ground units. The combination of good attackers and weak defensive outposts insured success by late evening and gave German forward observers good locations to observe fires on the main Soviet lines of defense. Torrential rainstorms slowed movement and occupation of forward assembly areas.

At 2300 hours on the night of 4 July, several platoons of combat engineers and selected *stosstruppen* (assault detachments) from the 3d battalion of the *Regiment Deutschland (SSD)* infiltrated forward and began to reduce defensive outposts. Most units across the front used some version of infiltration tactics.[116] Engineers also began clearing lanes in minefields. Many accounts mention the capture of some German engineers and claim one corporal gave away the exact time of the attack which prompted

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[116] In the *Grossdeutschland*, infantry infiltrated forward to engage defensive positions in conjunction with the lead waves of the attack. For an account of this, see Guy Sajer, The Forgotten Soldier (New York: Harper and Row, 1971); reprint, London: Sphere Books, 1985, 209-228 (page references are to reprint editions).

a heavy Soviet artillery barrage on forward assembly areas. Almost every source consulted disagrees as to the effect and even length of this fire. In the *Das Reich* sector, many troops were already deep into the Soviet positions and thus escaped this fire. The daily log of the XLVIII *Panzer Corps* noted Soviet artillery fire fell on forward positions all night and some ground combat still continued all night as well. While Soviet sources and some others claim that the Soviet fire delayed the attack for several hours, unit records show no such effect. This author believes that most authors ignore the infiltration and dismounted attacks, considering the attack to commence only when artillery concentrations fall and main units move out.

Sources also disagree on the exact start of the main German attack on 5 July. Unit reports indicate that the 2d *SS Panzer Corps* jumped off at 0430. The *Grossdeutschland* and the 3d *Panzer Division* of XLVIII Corps jumped off at 0500. Generally, after a two hour preparatory fire, the main German units jumped off to pass through the *stosstruppen* and the lanes cleared by engineers through minefields. Progress across the front varied with terrain and the strength of the defenses. Within the *SS Panzer Corps* sector, units made deep penetrations, aided by strong air support. The northern pincer fared less well throughout the entire battle.

For seven days, the Germans slugged their way forward through the Soviet defensive lines. Engineers and infantry went forward under cover of darkness to clear mines when possible. During the day, tanks led the attack with mounted infantry offering close support. The main thrust of the 2d *SS Panzer Corps* angled northeast, countering Soviet expectations of a strike directly northwards and avoiding the strongest positions.

On the first day, the Voronezh Front moved up the 1st Tank Army and a reserve Rifle Corps to stiffen the defense. By the 12th of July, despite heavy casualties and losses of materiel, the Germans stood poised to break through the defensive positions and shift over to a more mobile battle. Soviet armored reserves of the 5th Guards Tank Army met the advancing German troops around Prokorovka and so began the largest tank battle in history. Losses on both sides mounted rapidly.

Other factors added into the equation. North of the Kursk salient, the Soviets launched an offensive that threatened the rear of the northern pincer by driving towards Orel. Earlier, on the 10th of July, Allied forces had landed in Sicily. Fighting continued with most Germans of all ranks convinced victory was in their grasp. Finally, on 17 July Hitler ordered the *SS Panzer Corps* pulled out to meet other threats and also pulled out other armored units. This ended Operation CITADEL. The Soviets retained the battlefield and thus German tank losses were severe, since many damaged tanks could not be recovered for repair.[117]

5. Use of Intelligence/Patrolling

The location of the German 1943 Summer offensive ranks among the worst kept secrets of all time. As early as 8 April Marshal Zhukov advised Stalin that the first German effort would be to reduce the Kursk salient. Considering that the Feuher's order

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[117] For various accounts of the overall fighting, consult Dunnigan, Russian Front, 45-49, German Military Studies, 68-81, Piekalkiewicz, Citadel, 136-215, Mellenthin, Panzer Battles, 219-240, Jukes, Kursk, 45, and Friesen, Interview, 28 December 1990. For citations of unit records, an excellent source is Historical Evaluation and Research Organization, A Study of Breakthrough Operations (Dunn Loring , VA: Historical Evaluation and Research Organization, 1976), 122-123.

cited earlier was dated 15 April, note the following passage from a Soviet report dated 12 April 1943.

> The enemy's objective is to strike concentric blows from the Belgorod area to the northeast and from the Orel area to the southeast and encircle our troops positioned west of the Belgorod-Kursk line...most likely in the final days of May.[118]

With large forces in close proximity to each other for long periods of time, both sides engaged in detailed reconnaissance efforts. While this offered obvious advantages, the long preparation period gave away any real chance at total surprise. The scouting efforts took many forms. Aerial photography provided pictures of virtually every foot of frontage. Both sides conducted such activity and both sides took countermeasures. Some sources claim the Soviets dug up to 1,000 kilometers of false trenches, constructed 13 dummy airfields and took other measures. General Von Mellenthin acknowledges the Germans underestimated Soviet strength. German countermeasures included making most major moves at night before the battle. Throughout the war, German staffs planned and physically monitored such movements and took great pains to insure smooth execution thereof.[119]

The Germans went to great lengths to gather detailed information on the ground.

> The Germans gave battlefield reconnaissance a much higher priority than did any of the armies they faced. From the beginning they organized and trained special

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[118] Piekalkiewicz, Citadel, 40.

[119] Mellenthin, Panzer Battles, 219, Dunnigan, Russian Front, 47, Piekalkiewicz, Citadel, 40 and 81.

> reconnaissance units...The Germans believed in fighting for information. Thus, the reconnaissance unit was not only very mobile and well-equipped, but also very heavily armed.[120]

These *aufklärungs* battalions included eight-wheeled vehicles (*Panzerspähwagen*) which could travel up to 60 miles per hour on roads and had a driver at both ends to get in and out of trouble rapidly. Units also had motorcycles with sidecars. These sidecars had driveshafts of their own to increase mobility through rough or plowed ground.

Units in the line constantly sent out small patrols to gather the scraps of information that unit intelligence officers could weave together into the mosaic that would guide detailed tactical planning and save lives. Previous experience taught the scouts where the Soviets would probably position their forces. Scouts set up observation posts and might lie in position for 24-48 hours observing minefields being laid or similar activity. These so-called *späh* troops went out in squad size or less. Interrogation of civilians offered other information of varying quality. The Soviet deserters (*Hilfswillinge*) who served the Germans aided in deeper scouting as well as listening in on Soviet communications. These *Hi-Wis* went up to 10-20 kilometers deep for 3-5 days to bring back information. Such men could pose as civilians or soldiers and could easily be replaced when they failed to return.[121]

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[120] Dunnigan, Russian Front, 129.

[121] Details of ground reconnaissance efforts come from Friesen, Interviews, 30 Nov 90, 14 Dec 90 and 28 Dec 90.

6. Obscuration/Use of Smoke

Published accounts do not mention smoke employment and do not give night operations their due. While details will be covered in other sections, one should note that the main attack began shortly before midnight with major infiltration. This allowed assault troops and engineers to subdue outposts and clear gaps (*gasse*, literally alleys or lanes) in minefields under cover of darkness. Here, one should bear in mind that first light during the Soviet summer came at around 0315, so attackers had little time to work under cover of darkness. The subsequent jump off time was between 0430 and 0500 after two hours of artillery fire.

The regular troops loved smoke and used it whenever possible. The 2d *SS Panzer Corps* attached *Nebelwerfer* (literally, fog-thrower) Regiments 1 and 55 to *Das Reich*. Soldiers loved these multi-barreled rocket launchers which threw 150mm smoke or high explosive shells a distance of roughly seven kilometers onto the enemy positions. "The most important deal is to smoke the enemy...[and] they [*Nebelwerfers*] took care of everything, I can assure you." Standard procedure in the *Division Das Reich* was to put smoke directly on the enemy and allow it to lift just as the attacking units arrived on top of them. Tank commanders also carried many smoke grenades to throw for local screening as needed.[122]

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[122] Details of tactical smoke employment and equipment come from Friesen, Interview, 28 Dec 90. Information on first light during the battle and other information can be found in John Lucas, Germany's Elite Panzer Force: Grossdeutschland (London: MacDonald and Jane's, 1978), 69-70. The *Nebelwerfer* barrages produced such rapid variations in air pressure with HE warheads that many Soviets died of internal injuries alone. Details of the *Nebelwerfer's* design and history comes from James Lucas, War on The Eastern Front 1941-1945 (New York: Stein and Day, 1980),

7. Tank/Infantry Cooperation

The German Army of 1943 employed tactics well grounded in theory and practice. Contrary to the popular image of the German Army being virtually flawless from the beginning to the end of the war, German officers ruthlessly examined performance early in the war and instituted needed improvements. Interestingly, many of the disparaging comments about U.S. forces are almost exact quotes of comments about some German units during the Polish and French campaigns. Many German officers studied their victorious campaigns quite critically and had time to institute improved training. In fact, many observations concerned assaulting prepared positions and movement control. Realistic training improved this performance until later wartime records universally cite these as significant strengths. The cohesion of units and the German style of leaving officers with their men in the units rather than rapidly shifting from line to staff as some armies did aided these training improvements.[123]

While many refinements occurred over the course of the war, the basic techniques stayed remarkably constant. For instance, in France, infantry learned that attacking fortified positions required special equipment such as explosives, grenades and automatic weapons. A reader who examines the composition and employment of assault

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161-175.

[123] For examples of these weaknesses and improvements, see Lewis, German Infantry, 90-111.

detachments used near Leningrad in 1941[124] will see virtually identical accounts from Kursk in 1943.

> Assault detachments normally are composed of infantry with engineers attached. A typical assault detachment consists of the following: one officer; obstacle clearing party, consisting of two to six men for each lane to be cleared, equipped with small arms, wire-cutters, and bangalore torpedoes and other explosives; embrasure-blasting party consisting of three or four men equipped with grenades and demolitions or pole charges. This party may also include, though it may work independently, a flame-thrower party, consisting normally of two men; covering parties, normally two or three parties of varying size from three men with one light machine gun to full platoons; smoke party consisting of two or three men equipped with smoke candles or grenades; supply party, carrying reserves of equipment and ammunition, their strength depending upon the size of the assault detachment.[125]

These basic techniques of infantry and engineer cooperation cleared the way for the armor to follow. Thus, while not strictly tank-infantry cooperation, the infiltration of assault detachments during the night preceding a tank-infantry assault was a critical prerequisite.

Within the 2d *SS Panzer Grenadier Division Das Reich*, the *schwerpunkt* (main effort) of the attack was given to the *SSD*. *Obersturmbahnfuerher* Harmel designated the 3d Battalion as the main effort within the *SSD*. Beginning at 2300 hours on 4 July, specially selected infantry platoons augmented with engineers carrying heavy, medium and light flamethrowers moved forward to engage Soviet outposts. Master Sergeants led

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[124] See Commander, 3d Battalion, 490th Infantry, "Attack on Fortified Positions. Rolling up of the Outer Ring of Leningrad," Small Unit Tactics, MS#P-060a, 80-130, Hellmuth Reinhardt, "Defense of a Dominating Height by a Russian Company," Small Unit Tactics: Infantry Part 1, MS#P-060d, 18-24. These documents are held on file at the U.S. Army Military History Institute at Carlisle Barracks, PA. Also see "German Surprise Attack by Night," Night Combat DA Pamphlet No. 20-236 (Washington, D.C.: Department of the Army, 1953), 30-31.

[125] U.S. War Dept., Handbook, IV-18.

most of these detachments and infiltrated across frontages of several hundred yards to fall upon defenders suddenly out of the darkness. Within four hours, some detachments had penetrated 4-5 kilometers into Soviet positions. The destruction of these outposts allowed engineers to work free from defenders' interference.

In the main attack, tanks formed the first wave and led the attack. Tank companies usually used a standard wedge formation or on occasion a "blunt wedge" which corresponds to the current U.S. "vee" formation. The extreme flexibility and many tactical reorganizations during a given day meant that no one formation saw use every battle. Individual tanks usually maintained 50 meter intervals between themselves and often had a few infantrymen riding on the back deck of each vehicle. *Panzer grenadiers* followed about 150 meters behind in their *SPWs*. Each of these *SPWs* carried some kind of armament such as a mortar, flamethrower or 37mm cannon in addition to an infantry squad. An average attack had equal numbers of tanks and *SPWs* with a battalion frontage of 1,000-2,000 meters in breakthrough sectors. Leaders stressed speed and continued movement.

Luckily, the low level of training in the hastily raised Soviet units usually meant that their first antitank rounds fell short. German tank commanders regularly practiced range estimation and suppressive fire of machine guns and high explosive tank main gun rounds usually fell accurately and quickly. If possible, tanks rolled right over or by Soviet defensive strongpoints and engaged the next line of defense. When engaging enemy armor, tank units used a cross fire pattern so that rounds hit enemy flanks rather than the thick frontal armor. About one third of the infantry accompanying the attack

would dismount and spend no more than 10-15 minutes assaulting the positions. The firepower of *SPW* mounted flamethrowers and the like helped achieve fire superiority rapidly and infantry squads carried machine guns and explosives. The tanks and remaining infantry continued to move and these assaulting infantry later rejoined the rest of the force. If the attack ran out of infantry because of the number of positions encountered, the tanks would wait, continually shifting around and watching for antitank guns and close assaulting Soviet infantry.[126]

8. Engineers: The Most Dangerous Job in the German Army

Other combat troops bestowed high accolades upon the *Sturm Pioniere* (assault engineers). As noted earlier, engineer detachments armed with flamethrowers and demolitions played a critical role in the initial attacks. German assault detachments tended to contain between 8-35 men, usually with two flamethrowers and other engineer support (hollow charges or bangalore torpedoes) as necessary. The heavy German emphasis on assault detachments has made written research material plentiful, but

> There are hardly any photographs of assault detachments in action...The task was too important and too dangerous, an accompanying war-correspondent or only a camera taken along could endanger the comrades and even the whole operation.[127]

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[126] Details of tactical formations and equipment come mainly from Friesen, Interviews, 30 Nov 90, 28 Dec 90, and 23 Feb 91 as well as from United States War Department, Handbook on German Military Forces, TM-E 30-451 (Washington, D.C.: U.S. War Department, 1945), IV-9 through IV-13.

[127] Pioneer Comradeship [Association] Dresden, Pioniere der Waffen SS Im Bild (Osnabrück, Germany: Munin Verlag, 1985), 72.

Since an earlier section of this chapter discussed the key engineer role during infiltration attacks, this section will concentrate on other engineer roles.

Close behind the assault detachments the first night came engineer teams to lift mines. This occurred each night, so often the engineers operated without as much protection and clashed with Soviet patrols in the darkness. These engineers used mine detectors and manual probing to detect mines for picking up or blowing in place. Once they considered a lane cleared, engineers marked it with colored flags placed every few meters on both sides of the lane. Some tanks had rollers mounted on them and these vehicles "proofed" the lanes when possible. At times, engineers simply marked mines with flags and follow on forces weaved through the minefields. One key factor in choosing the main attack's jump-off time was to allow attacking troops to spot mines and avoid them. No narratives mention the infantry having serious problems with mines. During the build-up, thorough training took place so that soldiers could spot tell-tale signs of mine positions. This training helped overcome the fear of mines that make up so much of the effectiveness of mines.

Other mine countermeasures existed besides the engineers manually clearing them. The Soviets developed certain habits concerning where they laid mines and with experience many Germans could apparently discern these locations and avoid them. Units such as the *Das Reich* avoided choke points and similar areas and seemingly did not suffer greatly from mines. Not all minefields stood out, especially older ones in tall grass. One minefield did stop the unit for several hours on the second day until engineers could move up and clear lanes under protection of the infantry. When engineers could

not go forward or speed was critical, the Germans directed heavy artillery concentrations directly onto the minefields. Such techniques also gave the infantry a lot of shell holes to use for concealment while moving forward.[128]

9. Artillery

German artillery used several different techniques to support attacks. Often, ground commanders preferred to rely on surprise and avoided preparatory fires. Another tactic was to wait until assault troops arrived at their jump off points and called for the fires to begin. When this call came through, the first rounds fell on the defensive positions to cover initial forward movement. Then fires shifted to counterbattery missions. One item of note is that the Germans did not employ artillery in the direct fire mode as other armies did because the German infantry units already had heavy caliber "infantry guns" organic to infantry units to do precisely that. Other artillery pieces could still use direct fire and did at Kursk, but "infantry guns" gave the Germans more responsive direct fire than others could achieve.

Faced with the denser defenses at Kursk, the Germans massed large numbers of guns to support the breakthrough, concentrating their fires on main positions and enemy guns, rather than the lightly held outposts, which fell to infiltration. First priority of artillery fire went to countering defending antitank weapons, along with emphasis on

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[128] Most of the information in this section was gleaned from Friesen, Interviews, 30 Nov 90 and 28 Dec 90. Corroboration concerning experience in spotting mines is found in Office of the Chief of Military History, Military Improvisation During the Russian Campaign, DA PAM 20-201 (Washington, D.C.: Department of the Army, 19510, 17-19 and Pioniere, 125-131. For general discussion of engineers, see Caidin, Tigers, 191, and Dunnigan, Russian Front, 131. Use of shell holes for cover is discussed in War Dept., Handbook, IV-18.

counterbattery fires and smoke missions. To provide rapid response to forward ground elements, each company in the breakthrough sector had a *Vorgeschobene Beobachter*, (forward observer) commonly known just as the *VB*. Each *VB* spoke directly to one battery, instead of through a fire direction center. Procedures existed to mass all fires if higher commanders deemed it necessary.[129]

A *Luftwaffe Flak* division took part in the attack as regular artillery. Many of the guns used direct fire to destroy defensive positions. Lighter *Flak* guns poured forth torrents of tracers which took a heavy psychological toll of defenders as well. As enemy artillery opened fire, heavier weapons switched to counterbattery fire.[130]

10. Air Support

During the fighting across the Kursk salient, neither side established total air superiority. Basically each side achieved parity overall and local superiority only for brief periods. German tactical air support nevertheless played a critical role in the German success at breaking through the actual fortified positions. All participants cite the key role of *Stuka* dive-bombers. No other armies employed dive-bombers to this author's knowledge, and no other armies received as much assistance from their air units as did the Germans. This would tend to indicate that precision in placing the ordnance is more important than amounts of ordnance.

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[129] For more detail on German artillery methods, see Toppe, Night Combat, 9-11, War Dept., Handbook, IV-13 to IV-19, and Friesen, Interviews, 30 Nov 90 and 28 Dec 90.

[130] See Military Improvisations, 20.

As early as 0300 on 5 July, Soviet aircraft attempted a surprise knockout blow against German airfields the Soviets hoped to find crowded with loaded aircraft. German *Freya* radar picked up the approaching attack and a rapid German reaction averted disaster. German fighters even claimed 432 kills for that entire day. Soviet aircraft did not disappear from the skies, however. With priority of the German *Luftflotte* 4 (4th Air Force) effort supporting the *schwerpunkt* of the 2d *SS Panzer Corps*, other units attracted Soviet attention. In late morning, Soviet aircraft struck concentrations of tanks and infantry as well as the Division Command Post of the *Division Grossdeutschland* with significant effect.[131]

One reason for the good German air support is that each company in the breakthrough sectors had a *Flieger Verbindungs Offizier* (Forward Air Controller) known as a *Flivo*. These controllers, *Luftwaffe* lieutenants or sergeants at company level and Captains at regimental level called in close air support within several hundred meters of forward troops. They arrived at the ground units in *kubelwagen* (jeeps) and so usually rode into battle in someone's tank and carried their radio with them to communicate with the pilots. The *Division Das Reich* received good support throughout the battle, despite shifting priorities. Even though Soviet aircraft got through on the third day and inflicted serious losses, relations between the tankers and the air forces remained good. Part of

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[131] For details, see HERO, Breakthrough, 124. This document contains almost 100 pages of unit daily reports. It shows that the *Division Grossdeutschland* and the U.S. 30th Infantry Division shared hard luck at the hands of friendly air attacks. The Germans also caught it from allied aircraft, too.

this is explained by the lack of fratricide from the *Luftwaffe* against the *SS* troops, unlike the luck of some other units.

Primarily, *Stukas* operated against defensive artillery units when possible, recognizing the great threat these units posed. (Artillery caused 45% of casualties on the Eastern Front, with heavy infantry weapons next at 35%.) In this mode, aircraft flew to general sectors and attacked guns as they opened fire. This style of "close enough" air support worked well. Many *Stukas* armed with 37mm cannon under each wing sought out Soviet armored units moving up and engaged in "tank-busting" with great effect. On 8 July, air power alone knocked an entire Soviet tank brigade out of action before it could hit an unsuspecting *Das Reich* in the flank. Aerial scouting missions also helped screen flanks and give commanders much needed intelligence.[132]

11. C2: The Nerves of an Army[133]

German command and control decentralized decision making to lower levels than other armies. This 'tactical' orientation differed from others, such as American. Such an outlook explains the loose control of artillery and air assets noted previously.

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[132] For further information on German and Soviet air operations, see Caidin, Tigers, 201, Von Mellenthin, Panzer Battles, 225, Piekalkiewicz, Citadel, 136, Busse, German Military Studies, 78-79, Dunnigan, Russian Front, 48-49 and 146, and Major Kerry Pierce, Kursk: A Study in Operational Art (Fort Leavenworth, KS: School of Advanced Military Studies, 1987), 22-23. Details of *Flivos* and similar data comes from Friesen Interviews, 30 Nov 90, 14 Dec 90 and 28 Dec 90. Interesting readings of questionable exactness can be found in Paul Carell, Scorched Earth: The Russian-German War, 1943-1944, translated by Ewald Osers (Boston: Little, Brown and Company, 1970), 61-66. While Carell's writings are excellent first hand accounts, this author does not feel Carell checked these stories closely enough for them to be used alone for academic research.

[133] Dunnigan, Russian Front, 136.

Such an outlook explains the loose control of artillery and air assets noted previously. One reason this system existed was that the entire overall German system supported it. Two short examples will illustrate this point.

Officers of more junior ranks did not rotate between troop positions and staff positions. Officers also went through a very long commissioning process. Arnold Friesen became a Tiger tank platoon leader before Kursk at the age of 17 as an *SS* Officer Candidate. He finished the war as a 1st Lieutenant two years later and never left his unit except for some additional training. One must also recognize that Non-Commissioned Officers filled many key tactical leadership positions. Units stressed cohesion to an extreme degree. Tank crews remained together, period. If a man suffered wounds, a filler from a pool kept within the unit took his place until the original man returned to his original position. Sometimes losses required breaking up crews but this was avoided when possible. The cohesion and experience at lower tactical levels facilitated the repeated task organizing to meet various situations that characterized good German units. Constant training occurred.

> The training of leadership went hand-in-hand with the training of troops...Officers and non-commissioned officers of all ranks were trained for the attack by means of sand table exercises, map exercises, and terrain tactical orientation meetings.[134]

Interestingly, this high amount of low level tactical initiative existed along with some very centralized planning and control. The assembly of attacking forces preceding

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[134] Busse, German Military Studies, 67.

the attack occurred over several nights of very short periods of darkness. Note the following considerations,

> The movement of large numbers of troops into an assembly area during a single night requires meticulous timing and rigid traffic regulation. It is advisable to control these movements by a special staff having the authority to regulate the traffic and sufficient traffic control personnel at its disposal. A dense communications network, including fully operational control points, should be established along the approach routes to guarantee the smooth flow of movements. Approach routes should be marked with luminous signs. Delays caused by broken down vehicles will be avoided if POL dumps and recovery elements are placed along the approach routes and if detour routes are designated in advance.[135]

Other C2 factors included marking convoys with numbered panels to facilitate monitoring by light aircraft and firing artillery harassment missions to mask vehicle noises.

One German veteran stated that "the most important thing in combat is communications." The radio configurations of the tanks facilitated this. The Tigers had a five man crew which included a bow machine gunner who operated the radio. This radio was not the standard receiver/transmitter that the tank commander used to speak within the unit. This radio was a Morse set with a range of almost fifty kilometers. Any tank could, if necessary send a message all the way back to regimental or divisional command posts. Also, higher commanders could broadcast orders to all tanks simultaneously.

Visual signals contributed to both communications and control. Tank commanders had flare pistols and almost all accounts relate consistent use of flares for signalling such information as friendly and enemy positions, direction of fire, or friendly

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[135] Night Combat, 9.

infantry under tank attack. These signalling colors obviously changed meanings daily and flares also provided illumination. Visual signals, especially illumination types, aided land navigation during limited visibility. Artillery illumination rounds, tracers and paired searchlights in rear areas helped reconnaissance elements and others navigate in the largely featureless terrain. Other visual signals used in stationary positions included writing on blackboards for rear observers to read through field glassed and sending Morse code with signal lamps.[136]

12. Special Weapons/Unique Employment of Assets

Flamethrowers, especially the ones mounted in the *SPWs* played major roles in killing defenders or persuading them to vacate positions. If engineers in assault detachments carried such heavy and dangerous equipment throughout the war, there had to be something to it. Other engineer efforts included use of the "Goliath," a small tank-like vehicle loaded with 200 pounds of explosives. These measured four feet in length by two feet by two feet and could be wire guided. They worked with varying success against mines and defensive positions. A version five times larger apparently existed on the northern front. This required human guidance part way and reportedly cleared a lane 400 yards deep with a 50% driver survival rate. This battle, delayed to wait for the Panther tanks and the *Ferdinand* Assault Gun, exposed major flaws in each and demonstrated the danger of relying on untested weapons. The Panthers, fresh from the assembly line, suffered from normal teething problems or *kinderkrankeit* (child sickness).

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[136] For elaboration of C2 measures, peruse Dunnigan, Russian Front, 139, Night Combat,8-11 and 32-33, Friesen Interviews, 30 Nov 90 and 28 Dec 90.

Overheating caused fires in the engine compartments and knocked out one fourth of the entire Panther force on the move up to the first battle where they stumbled directly into a minefield. The *Ferdinand* came with no machine guns and thus could not defend itself against Soviet infantry without friendly infantry to protect it.[137]

13. Historical Lessons

Writers of far higher pedigree than this author have examined the fighting at Kursk to draw out lessons. Mellenthin's observations concern the attack of armor against antitank concentrations,

> 1. Every opportunity must be taken for reconnaissance in the air and on the ground.
>
> 2. The armored formation carrying out the attack must be made as strong as possible by super-heavy tanks, brought to bear in the Schwerpunkt.
>
> 3. Fire concentrations by tank guns must be rapid and effective; the armor must keep moving and tanks should only stop to fire their guns.
>
> 4. Observers for all heavy weapons supporting the attack must travel with the armor. Wireless communication between the tank leader and the air is most essential.
>
> 5. Engineers in armored vehicles must follow the armor.
>
> 6. Light tanks must be at hand to exploit success.
>
> 7. Fuel and ammunition supply for the armor must be assured during the battle for armored supply carriers. Much experience is needed to carry out this difficult operation.

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[137] For discussion of the equipment unveiled at Kursk, check Carell, Scorched Earth, 42-54, Busse, German Military Studies, 74, Caidin, Tigers, 186-189, and Friesen, Interviews 30 Nov 90 and 14 Dec 90. For good photographs and data on German flamethrowers, both man-portable and vehicle mounted, see Pioniere, 152-154, 181, 215-230.

8. Tanks should be supplied with smoke gear to blind enemy antitank weapons, and with colored-smoke grenades for unit commanders to indicate direction.

9. For night attacks tanks should be supplied with direction-finding equipment.[138]

Other sources describe the "Eastern School" of German offensive tactics.

1. It was not necessary to cover the entire sector allocated to an attacking unit. The Russians were not apt to bother open German flanks.

2. Russian anti-tank defenses could not be breached by tanks alone. Infantry had to do most of the work with tanks supporting.

3. Although the "attack on the move" was a German specialty, it was avoided since even a little (a few hours' or days') preparation paid large dividends in fewer German casualties. Russian defensive preparations were often thorough but easier to defeat with a little preparation.

4. Tanks should attack in waves. This allows them to support each other and makes control easier. The reinforced (with infantry, etc.) tank regiment attacked on a one kilometer front, the panzer division on a 2-3 km front. Once the hole was punched, it had to be exploited.

5. Infantry that were carried on tanks and other vehicles left their transport at the last possible moment in order to keep the attack moving. All vehicles, armored and non-armored, moved by bounds from cover to cover.

6. Artillery used smoke-shell and concentrations to screen the flanks of the attack from enemy interference and artillery observation.[139]

German training directives published in 1944 highlighted the main points for German attacks. First, careful reconnaissance was cited as critical. Once the attack began, artillery, air and direct fire needed to suppress the entire *pakfront* (integrated

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[138] Mellenthin, Panzer Battles, 232.

[139] Dunnigan, Eastern Front, 141.

system of antitank defense). This directive casually mentioned the infantry crossing the minefield, so antipersonnel mines apparently did not seriously effect movement. Other points highlighted included using smoke, rehearsals, attack wedges and organizing infantry units into assault detachments.[140]

A review of the material presented in this chapter highlights several factors key to German success in penetrating the strong fortified positions. Thorough reconnaissance helped units identify obstacles and thus avoid known trouble as much as possible. Infiltration tactics by well equipped assault teams moving very deeply under loose control paid great dividends and showed that tactical surprise is attainable even when strategic surprise is thrown away. Flame weapons made great contributions in reducing defenders' will to fight on.

Manual reduction of minefields remained the main method, with all its attendant dangers and delays. The "Goliath" showed some promise in clearing mines more quickly and with less cost. Artillery used to clear minefields offered a solution and showed that heavy bombardment of some type will clear thick minefields. The most worthwhile technique seemed to be the training given to combat troops to spot and avoid mines. Close cooperation between tanks and infantry was absolutely essential, with tanks leading whenever possible. Smoke should be placed directly on top of defenders and on flanks of attacks to blind defenders but not attackers. Overall, the combination of large-

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[140] Army General Staff/Training, "Breaking Through a Pakfront", Training Directive No. 28 (East) (Berlin: Army Headquarters, 14 July 1944), and Army General Staff/Training, "Lessons Learned: Attacks Against Fortified Positions," Training Directive No. 25 (West) (Berlin: Army Headquarters, 30 April 1944).

scale infiltration with intensive engineer preparation guided by thorough reconnaissance broke up defenses. With this preparation, a tank led force with close air and artillery support made great gains considering the extensive depth and strength of the defenses.

Enemy artillery, the greatest threat, had the highest priority for air attack. The *Stukas'* effectiveness showed that accuracy in placing ordnance makes up for lack of quantity. This accuracy came in some measure from the practice of placing Forward Air Controllers down at company level in breakthrough sectors which provided more controllers than normally existed. Artillery firing on forward positions (including the large volumes of tracer ammunition for psychological effect) and then on counterbattery appeared more successful than the opposite (British at El Alamein) approach. Good radios and uses of many visual signals facilitated command and control in the confusion, noise and horror of combat.

V. THE AMERICAN EXPERIENCE

> As a fortifier of morale, an immediate and visible form of support is infinitely more efficacious than a distant and unseen one.
> *B.H. Liddell Hart: Great Captains Unveiled, 1927*

This chapter examines the development of the American style of dealing with fortified positions. Much of the learning came in Normandy and the later fighting against the Siegfried Line positions showed certain refinements of the basics. Study of the *Westwall* fighting is of value, but devoting an entire section to it would be overly long. This author will, therefore, insert relevant points pertaining to the later fighting within the appropriate subsections of section A. Analysis of the U.S. Marine experience in the Pacific comes in section B.

A. THE NORMANDY BOCAGE: A TERRIBLE BLOOD-LETTING[141]

Throughout June and July of 1944, Americans fought their way onto the European continent and then through a section of France commonly known as the *Bocage*. This section traces the development of tactics in various units to deal with terrain favoring natural fortified positions. The "bottom-up" development of these tactics contributed to the success of the final breakout, Operation COBRA.

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[141] Erwin Rommel described the Normandy campaign with the statement "It was one terrible blood-letting." The Rommel Papers, 496, quoted in D'Este, Decision,, 508.

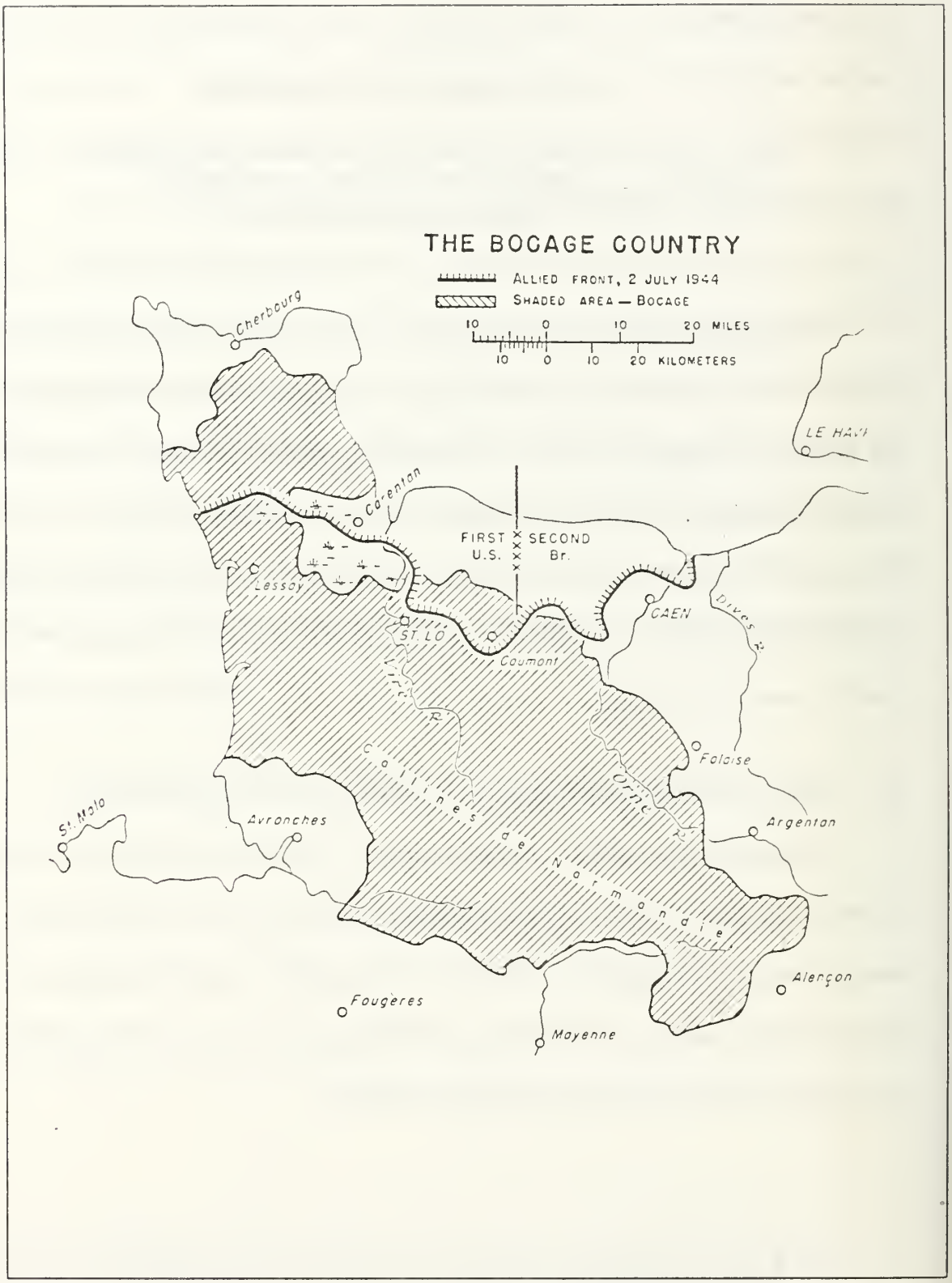

Figure 4: The Bocage Country (See Blumenson, Breakout, 12)

1. Terrain: This goddamn country[142]

Allied planners focused on getting the Army ashore and basically ignored the operational techniques, special equipment and tactical training needed to fight in hedgerow country. The *Bocage*, anything but conducive to employment of tanks, is an irregular patchwork of small fields, bordered by hedgerows and cut by sunken roads. These hedgerows, the property markers of local farmers, are dirt embankments varying from one to four feet in thickness and in height between three and twelve feet. On top of the dirt is a tangle of trees and thickets, varying between one to three feet in thickness and between three to fifteen feet in height. Overall, the *Bocage* covered more than 400 square miles of the province of Normandy. This type of terrain provides natural obstacles to canalize attackers, prevents them from massing, offers cover and concealment to defenders, and limits observation necessary to control artillery and air strikes.[143]

2. Defenders

a. Normandy

German defenders, outnumbered, bereft of air cover, and deficient in transport, still held the advantage in tactical acumen. While facing long odds, they still had advantages,

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[142] For the American soldiers' opinions on local geography, see Martin Blumenson, Breakout and Pursuit, (Washington, D.C.: Department of the Army, 1961), 12.

[143] Several sources provide descriptions of the Bocage. See English, Infantry, 141, Blumenson, Breakout, 10-12, and Michael D. Doubler, Busting the Bocage: American combined Arms Operations in France, 6 June-31 July 1944, (Fort Leavenworth, KS: Combat Studies Institute, 1988), 11-16.

> ...German troops held the best positions they could hope for in France. The line was relatively short; the terrain was naturally strong; the battlefield imposed serious restrictions on Allied deployment. Only a small sector of open ground near Caen was difficult to defend. With reserves on the way, the Germans could reasonably hope to hold out until the decisive counterattack or the miracle promised by Hitler turned the course of the war.[144]

The Americans faced the German Seventh Army, which controlled the LXXXIV Corps and the II Parachute Corps. Overall, these units controlled around 35,000 combat troops, 50 medium tanks, 26 Panther tanks, no 88mm guns, little artillery, and no *Nebelwerfers*.[145] German skill counted more than numbers at the lowest tactical levels, although sheer mass of materiel will eventually grind up even the most skillful bodies. Units such as the 2d *SS Panzer Division Das Reich* came to the Western Front from combat in Russia. These men soon learned the war was very different against the Americans. When fierce fighting halted to allow stretcher bearers of both sides to gather wounded, one tank officer noted that "It was the first hint that this war would be different...In Russia, we would have driven straight over them."[146] Iron bonds of cohesion held German troops together and high quality, well trained junior leaders led them in a defensive style characterized by immediate counterattacks by small groups using infiltration tactics. Small numbers of Germans, constantly chattering to dispel

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[144] Blumenson, Breakout, 50.

[145] The 88mm guns all belonged to the III *Flak Corps*, busy against the British. The *Nebelwerfers*, artillery and most tanks also faced the British in the open country to the north. See Blumenson, Breakout, 29-31.

[146] Max Hastings, Das Reich: The March of the 2nd SS Panzer Division Through France (New York: Holt, Rinehart and Winston: 1981), 215-216. The astute reader noted that in Chapter 4 the unit was *panzer grenadier*. The designation changed in January of 1944 to the one cited here. Friesen, Interview, 5 Mar 91.

loneliness and heighten cohesion, used high volumes of fire to "help themselves forward" and defeat Americans in their [Americans] own minds.[147]

In the *Bocage*, as against the British, defenses followed a fairly standard layout. Three belts of fortified areas stretched back up to ten miles in depth. First came the outposts, lightly manned, and employed to break up attackers with artillery and absorb the initial bombardment in mostly empty space. The Advance Position had more wire and mines to protect the greater numbers of infantry, the tanks, self-propelled guns and mortars. These troops might defend, or counterattack into the outpost zone as necessary. Finally, the Main Position held the strongest forces and reserve forces stood ready to counter-attack any penetrations.[148]

b. Siegfried Line

By this stage of the war many German troops of doubtful quality filled hastily raised units. Many men fell during the long retreat across France. While many good soldiers remained, they needed time to rest and refit. German commanders wisely put the lower quality soldiers in existing defensive positions when possible. Yet, as one American soldier noted,

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[147] For descriptions of German infantry qualities, see English, Infantry, 142-145. In training at the U.S. Army's Ranger School, this author learned first hand that if soldiers can hear only enemy fire, they will consider the fight lost, but if their own volume of fire is greater, they will believe themselves victorious.

[148] For the ground level view of the fighting in Normandy, see John Ellis, The Sharp End: The Fighting Man in World War II, (New York: Charles Scribner's Sons, 1980), 76-77. This book is also required reading for all men who eat quiche, can spell it without help, or pronounce it.

> I don't care if the guy behind that gun is a syphilitic prick who's a hundred years old-he's still sitting behind eight foot of concrete and he's still got enough fingers to press triggers and shoot bullets.[149]

Another author who fought in this time period wrote,

> Nevertheless, as American troops were to discover, steel and concrete can lend backbone to a defense, even if the fortifications are outmoded and even if the defenders are old men and cripples.[150]

The pillboxes themselves provided shelter, primarily from artillery, for troops who fought from trenches or other positions outside.

> A typical pillbox was 25 feet wide, 45 feet deep, and 20 feet high, with walls and roof of reinforced concrete form 3 to 8 feet thick. At least half the structure lay underground. Each pillbox contained web-bottomed bunks arranged in tiers to accommodate a usual complement of about fourteen men. Most had two firing embrasures. Though these embrasures provided only limited fields of fire, the pillboxes were arranged in clusters, so that guns in one could cover the approaches to several others.[151]

The *Westwall* included three zones of defense. Nearest the enemy lay the Forward Zone (*Vorfeldzone*) with observation posts, trenches, wire and machine-gun positions. The Main Defense Zone (*Grosskampfzone*) contained the major positions.

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[149] Ellis, Sharp End, 77.

[150] Charles B. MacDonald, The Siegfried Line Campaign, United States Army in World War II: the European Theater of Operations (Washington, D.C.: U.S. Army Chief of Military History, 1963), 35.

[151] Charles B. MacDonald, The Battle of the Huertgen Forest (New York: J.B. Lippincott, 1963), 16.

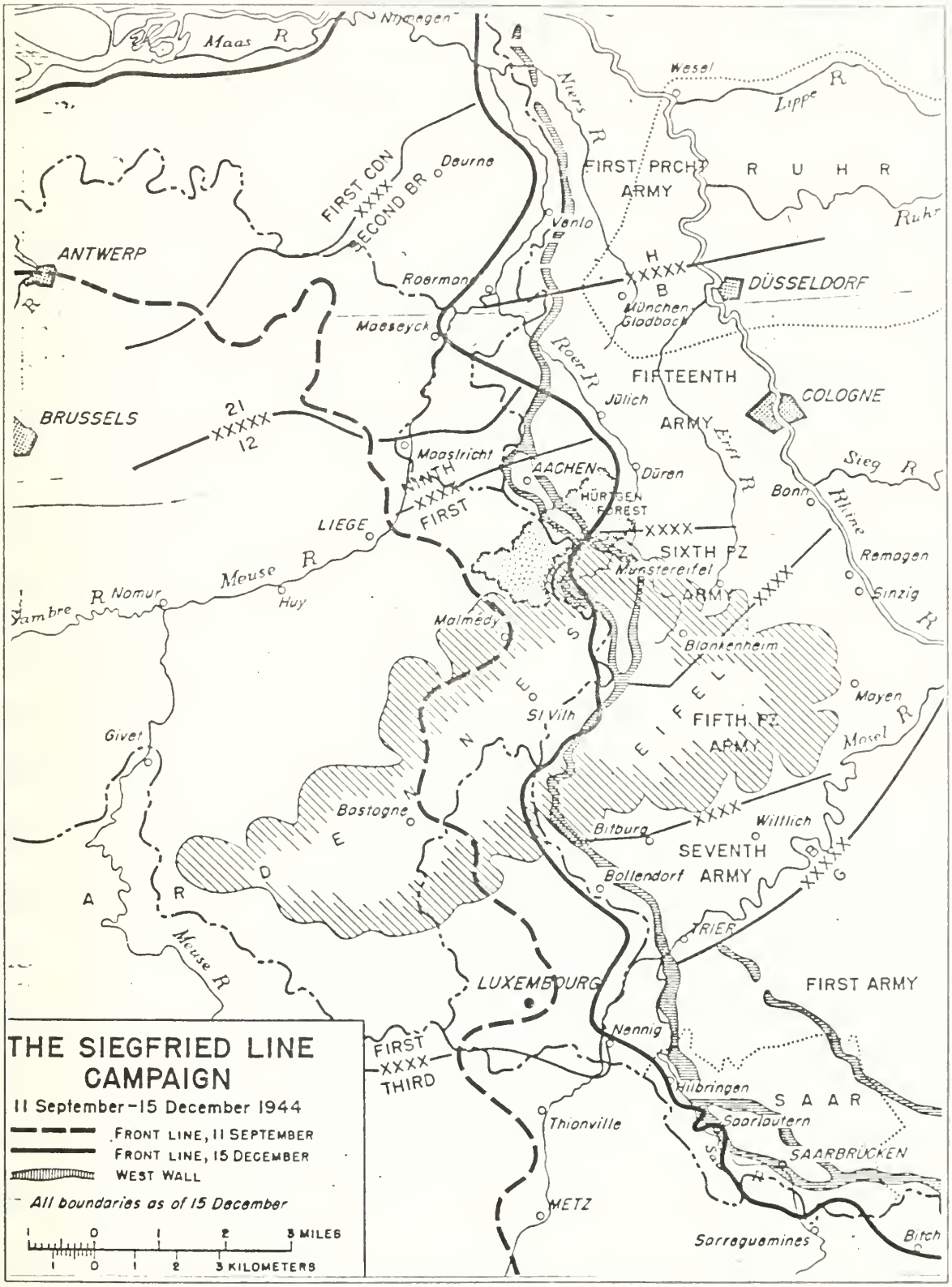

Figure 5: The Siegfried Line Campaign (See MacDonald, Siegfried, Map X)

These included pillboxes, casemates, anti-tank obstacles and guns. The Rear Defense Zone (*Ruckwartige Zone*) was similar to the Main positions, but was not as strong.[152]

3. Attackers

One must remember that almost all the American soldiers fighting in Europe had been civilians until eighteen months before and most had seen no combat at all. England had little room for realistic, large scale training. The most remarkable fact is that Americans improved so much and found solutions to the tactical problems of the Bocage in just over a month of combat.

The Army that fought throughout the months of June and July, 1944, did have many weaknesses. The "Ford Motor Car" mentality of interchangeable parts and mass production raised a huge force and supplied that force along with the rest of the free world. By its nature, however, it worked against cohesion and could not develop consistently good junior leaders. Armies reflect their national character, and the American troops would display great initiative and imagination in finding solutions to the tactical problem of the hedgerows. Unfortunately, many men would die while the Army climbed the learning curve.

Several weaknesses must be specified. American infantry did little except conduct frontal assaults. Inexperienced officers went by the book and attacked "two up, one back" in a linear fashion. Tanks and infantry did not cooperate well. No permanent organizations existed with both tanks and infantry in their composition. Americans relied

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[152] U.S. War Department, Handbook on German Military Forces, TM-E 30-451 (Washington, D.C.: United States War Department, 1945) V-1.

heavily on artillery, and it usually did well, but it too had weaknesses. Although "green" when it hit the beach, the American Army changed as it fought through the *Bocage*.

> ...The First Army that was to execute COBRA was not the same one that had launched the July offensive. Battle had created an improved organization, and a continuing continental build-up had strengthened it. What the army needed was the opportunity to get rolling, and COBRA might well provide just that.[153]

4. Narrative

Early fighting in June and July highlighted the raw state of most American divisions. One attack by the 90th Division is fairly indicative of the general state of training. On 3 July, the unit advanced with two regiments abreast through a pouring rain. Tanks and infantry made no real attempts to cooperate. Units went to ground immediately upon receiving fire and the nervous men fired at anything around them.[154] Men stopped when threatened with any type of flanking fires. Normally, units making contact pulled back and requested artillery fire on villages or assumed enemy positions. Small numbers of defenders could hold up large American units. In this particular battle, the 90th advanced less than a mile and lost over 600 men. All fighting had taken place only a short distance into the German outpost line.[155]

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[153] Blumenson, Breakout, 204.

[154] Artillery forward observers displayed great reluctance throughout the campaign to climb trees so that they could adjust fires. Nervous riflemen habitually shot at men in trees.

[155] For details of the fighting, see Blumenson, Breakout, 64-66. Another good source for general background is Keegan, Six Armies.

Typically, Germans placed machine-guns at corners of hedgerow fields, dug into the embankments themselves, and allowed American infantry to move forward in loose skirmish formation. With tanks roadbound, when the Germans opened up with automatic weapons and mortars, the infantry took heavy losses and could rarely even call in artillery because the enemy was too close and exact locations were hard to determine in the compartmentalized terrain. The rainy conditions throughout the battle grounded supporting aircraft much of the time. One particularly American tendency was for infantry to wait for confirmed targets, rather than use "marching fires" to suppress likely areas. Infantry did not follow artillery fire closely enough to get full benefit from it. Soldiers froze under fire and initially did not know that the best tactic was to advance out from under artillery and mortar fire. German mortar fire caused up to 75% of American casualties in the *Bocage*.[156]

Throughout July, U.S. forces developed tactics and special equipment to fight through the Germans fortified positions. Finally, in late July, heavy bombers utilizing carpet bombing techniques would provide the massive portable firepower needed and assist the breakthrough in Operation COBRA. The remainder of this section will examine the specific areas where Americans found solutions to the problems that initially bedeviled them.

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[156] Doubler, Bocage, 21-29.

5. Use of Intelligence/Patrolling

a. Normandy

Tactical intelligence gathered by Americans came from two sources: aerial photography and ground patrolling. The heavy rainfall and cloud cover prevented constant aerial reconnaissance. Patrolling, although mentioned in records, does not seem to have been truly extensive, and most patrols were apparently combat patrols rather than truly scouting.[157] When patrols did go out, they did not infiltrate deeply into the defensive positions nor did they take a great deal of time about it. One gets the impression that scouts preceded attacks by only a few hundred yards. Since attacks often started at first light, after only short artillery barrages, from where the previous day's advance had stopped, little good intelligence could have been gathered.

An overall study of American documents leads to the conclusion that no one considered deep patrolling much at all, or that scouts were not well trained enough to successfully penetrate German positions. Planners gave units boundaries and objectives, but never targeted specific strongpoints or positions. The inexperience of staffs and commanders apparently precluded consideration of such techniques. For example, one study by the G-2, Division Intelligence Office, of the 3rd Armored Division noted with apparent approval that "...ground reconnaissance *along* the LD had been effected."[Author's italics] This same battle analysis mentioned that the "...German ground counter-reconnaissance screen..." had prevented any accurate intelligence

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[157] For discussion of patrolling and the overly rosy intelligence picture at high levels, see Blumenson, Breakout, 57.

gathering. This author concludes that this screen was in fact the German outpost line and not a special screen.[158]

b. Siegfried Line

The 30th Infantry Division demonstrated its appreciation of the importance of intelligence when preparing for its attack on a section of the West Wall. Air and ground observations combined to pinpoint an estimated three-quarters of all pillboxes in sector. Planners targeted each known one for attention during the artillery preparation in the days before the assault. Intensive ground patrolling and infiltration provided precise intelligence which altered the original maneuver plan significantly.[159]

6. Use of Obscuration/Smoke

a. Normandy

Americans made almost no attempts to use natural obscuration or smoke throughout the fighting for several good reasons. First, the hedgerows limited observation to a few hundred yards. In such a case, only smoke pots and grenades would be useful, although mortar crews in the 29th Infantry Division did use smoke one hedgerow ahead to screen assault teams. Second, green American troops needed to see each other as much as possible for confidence. Also, as the force with the greatest air and artillery

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[158] See Colonel Charles H. Coates, "German Defense in Hedgerow Terrain (Villiers Fossard)," U.S. Army Ground Forces Observer Board, European Theater of Operations Report No. 141, (Washington, D.C.: U.S. War Department, 1944), 2-6. These reports will hereafter be cited as AGF Obs. Bd., ETO, Report No. and the individual title. These reports are filed in 6 volumes at the U.S. Army Military History Institute, Carlisle Barracks, PA.

[159] Macdonald, Siegfried, 253-255.

assets, Americans took pains to make themselves visible to preclude fratricide.[160] Third, despite the massive materiel support of Allied forces, Americans found themselves short of white phosphorous (WP) artillery shells during this period.[161] Tanks did on occasion use WP rounds on hedgerow intersections to burn out defenders. Tankers also praised the WP round in tank versus tank fighting. "Its use against enemy armor is giving excellent results, tending to blind the hostile tank crew and allowing our own tanks to maneuver."[162]

b. Siegfried Line

Units used smoke in several ways during this phase of the war. One way was to mark targets for close air support which helped pilots acquire the precise target requested. Screening and blinding smoke appears in many more historical accounts. The German 116th *Panzer Division* noted in its daily situation report for 14 September, 1944, that the Americans made heavy use of artillery and smoke screens.[163]

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[160] See English, Infantry, 143. Arnold Friesen also discusses how Germans copied American colored signal panels to confuse Allied pilots and avoid air attack. See Friesen, Interview, 14 Dec 90.

[161] Blumenson, Breakout, 42.

[162] AGF Obs. Bd., ETO, Report No. 110, "Armored Notes-Lessons from Combat in Normandy," p. 2.

[163] Smoke in a marking role comes from MacDonald, Siegfried, 254. The German observations are found in Lucian Heichler, "The Germans Opposite VII Corps in September 1944," in Charles B. McDonald, Operations of 7th Corps in September 1944 (Washington: Office of the Chief of Military History, [1953?]).

7. Tank/Infantry Cooperation

a. Normandy

This area, initially one of the main American weaknesses, saw the greatest improvement throughout the campaign. Combined arms training received little attention during the build-up in England. Initial unit organizations did not include habitual tank-infantry relationships. Written doctrine stressed tanks leading infantry or infantry leading tanks, but nothing about compartmentalized country in which neither one could routinely lead. The neophyte Americans did not truly understand that "...the people who really count in battle are the commanders and fighters at battalion level and below."[164] The nuts and bolts of communications and signals between the tanks and the foot soldiers had not been codified. Troops learned as they went along.

Each division, after bloody initial experiences, formed its own tactics to fight through the determined German defenders in their hedgerow positions. Tankers, growing weary of being easy prey for *Panzerfaust* antitank weapons and antitank guns sited along roads, developed special equipment to let them operate within the cover and concealment of the Norman fields. Infantrymen, finding that their cotton body armor failed to keep shrapnel and bullets out, wanted the mobile firepower of tanks to help them achieve fire superiority in the small areas of combat. Artillery, the best mobile ground firepower of all, needed efficient calls for fire to adequately support attacks. Commanders decided that basic tactical principles applied,

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[164] English, Infantry, 146.

> The task was to pin the enemy down with a base of fire and maneuver an element along a covered approach to assault from the flank...The tank-infantry team operating toward a short objective and with a simple plan proved to be effective. The objective was always the same, the next hedgerow. The plan was to provide for simultaneous advance of armor and infantry and their mutual support.[165]

Each division basically formed assault groups of varying composition, stressing the paramount importance of close coordination. The lowest common denominator in infantry divisions was that one infantry squad joined with one tank to be the nucleus of action. The tank existed to get the infantry forward and the infantry protected the tank. Other branches supported this goal.[166] In the 3d Armored Division, a tank company and infantry company operated together on a broader front. To allow tanks to accompany infantry through the fields required a technical solution to allow tanks to penetrate hedgerows. Communicating with the infantry would be both a technical matter and a matter of techniques. "Dozer" tanks with blades mounted like bulldozers could make openings in hedges, but few such vehicles existed. Field expedient methods of welding scrap iron on to form cutting devices met the need. The most famous was the "rhino" device of saw-teeth pieces of metal welded on the lower front of the hull, enabling the tanks to saw its way through obstacles. The need for such mechanical devices becomes clear when the reader considers that an attack going one and one-half

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[165] Blumenson, Breakout, 11.

[166] The principles of tank-infantry cooperation are found in several sources. See AGF Obs. Bd., ETO, Report No. 141, "German Defense in Hedgerow Terrain," Report No. 129, "Employment of Tanks and Infantry," Report No. 121, "Fighting in Close Country-Normandy," and Report No. 120, "Employment of Tanks with Infantry."

mile forward fought through thirty-four hedgerows. If engineers placed the fifty pound charges needed to blow paths through, each tank company would need seventeen tons of explosives. The engineers would be exposed to mortar and machine-gun fire throughout the process. Just as in breaching minefields, manual means are slow and costly, while mechanical means are faster and cheaper if they work.

Most tank and infantry radios did not use the same frequencies, so telephone handsets and visual signals took the place of radio. Smoke grenades and tracers marked enemy positions, while standard infantry hand and arm signals did double duty to signal such things as "commence fire" and "cease fire." These signals varied between units, since no standard ones existed Army wide. Leaving tanks and infantry squads together helped greatly.[167]

A brief summary of the 29th Infantry Division tactics will illustrate the use of the previously mentioned assault groups. Tanks moved up to the hedgerow marking the start line and opened fire on the next hedgerow. Infantry moved forward under this protection until they masked the fire of the tank and continued forward using their own fire and movement along with 60mm mortars. Engineers, meanwhile, blew a gap in the first hedgerow to allow the tank to move forward and assist the infantry in clearing the far hedgerow.[168]

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[167] For the best overall synopsis of tank-infantry cooperation, see Doubler, Bocage, 21-37.

[168] For details of the various infantry units' tactics, see Doubler, Bocage, 39-50.

All styles got units through the *Bocage*, but this section will focus upon those of the 3d Armored Division as promising faster penetration of fortified positions with fewer casualties. These tactics also resemble those of the Germans at Kursk, and thus will facilitate overall conclusions regarding the optimum techniques current units should use.

> ...Units attacked on a front usually three fields wide and always assaulted the center field last. The attack began as engineer teams or dozer tanks gapped the first hedgerow and indirect fire fell on and behind the forward German positions. An entire tank platoon then attacked with one section moving forward along each hedgerow paralleling the axis of advance. The Shermans put main-gun fire into the hedgerow to their front and sprayed the side hedgerows with heavy machine-gun fire. During the early phase of the assault, the tanks moved slowly enough so that supporting infantry could move with them and provide local security. The tanks also tried to protect themselves against German close infantry assaults by always staying at least twenty yards from the nearest hedgerow. After reaching the main German defensive position, the tanks turned inward and worked their way toward the center of the field, covering the hedgerows with heavy machine-gun fire. Together, the tanks and infantry cleared the German defensive position and then prepared to continue the attack. The second phase of the assault began when engineers or dozer tanks gapped the hedgerows bordering the center field. Assault teams of infantry and tanks from each of the original attacking platoons then attacked the flanks of the center German position. During the second phase of the attack, follow-on forces moved forward to occupy the hedgerow delineating the original line of departure and provided suppressive fire with tank cannon and machine guns. The attacking sections moved toward the center of the German position, spraying the hedgerow with machine-gun fire and rooting out any remaining defenders. Once the final objective was secure, the companies reorganized and prepared to continue the attack by repeating the same sequence of events.[169]

By late July, preparations for COBRA developed tactics for the more fluid breakthrough conditions when 2d Armored Division's Combat Command A, a

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[169] Doubler, Bocage, 51.

brigade sized element, attacked to exploit the carpet bombing and rupture German lines. General Rose's CCA and the attached 22d Infantry attacked in three waves. The first wave consisted of tanks alone using their own speed and firepower, along with artillery. Sherman tanks with eight infantry on each one followed in the second wave. The infantry protected their tanks and would dismount to move forward and assist the lead tanks if necessary. The third wave had tanks and infantry to clear out bypassed enemy. The awesome bombardment of 25 July, and the attack of the 30th Infantry Division, opened up the first German defenses to allow commitment of the 2d Armored on the 26th.

> ...The combined arms team worked closely together. Artillery observers rode in the lead tanks and brought accurate, indirect fire down on the enemy. Infantry battalion commanders with manpack radios rode in command tanks to better coordinate tankers and riflemen. The commander of the 22d Infantry reported that his soldiers were enthusiastic about riding the Shermans "Russian style." The infantry found that the tanks put the riflemen above grazing fire and gave them better observation. Riding on tanks that moved at irregular speeds also made the infantry more difficult targets. In two days, CCA penetrated more than six miles into the German Seventh Army's sector. [COBRA's] preparatory bombardment, sporadic German resistance, and the coordination and swift execution of CCA's attack resulted in light casualties for the Americans. By nightfall of 27 July, General Rose was on his objective, having lost only 3 tanks and less than 200 men.[170]

b. Siegfried Line

By this time, the assault detachment was an ingrained element of the assault. Artillery fire drove defenders under cover. Long range machine-gun fire aimed at the pillbox embrasures while tanks moved up to use direct fire. Then the infantrymen with demolitions and flamethrowers moved up to finish the job. While effective, this approach took time. One such assault, which went just as planned, took one hour and

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[170] Doubler, Bocage, 58.

fifteen minutes to reduce one pillbox. Most attacks went faster, but planners needed to have smoke and other supplies available to cover attacks of considerable time. The Germans also tried to reoccupy bypassed or cleared positions when Americans moved forward. To counter this, engineers blew up pillboxes, buried them with bulldozers, or welded their doors shut.[171]

8. Engineers

Engineers supported the tanks and infantry as mentioned earlier. Engineer work concentrated on blasting through hedgerows and sweeping lanes for mines to move the tanks forward. Later in July, the Rhinos and other devices enabled the tanks to cut through hedgerows faster than the engineers could blast, so combat engineer work lessened, while improving supply routes through the hedgerow gaps continued. Overall, infantry units learned that the best combat team must include a squad of engineers closely tied with tanks and infantry.

Preparing for COBRA, engineer units concentrated on road repair and clearing bypassed minefields to facilitate the build-up. Engineer Technical Intelligence Teams used captured mines when they trained soldiers in combat units how to clear the

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[171] For details of tank-infantry cooperation, see MacDonald, Siegfried, 261-272, and George Forty, Patton's Third Army at War (New York: Charles Scribner's Sons, 1978), 159. To learn more about dealing with bypassed pillboxes, see Alfred M. Beck, et al., The Corps of Engineers: the War Against Germany, United States Army in World War II: The Technical Services (Washington, D.C.: U.S. Army Center for Military History, 1985), 419.

minefields themselves. Recovery vehicles prepared to clear roads and recover destroyed German vehicles blocking routes of movement.[172]

9. Artillery

a. Normandy

Artillery played a key role throughout the campaign and had only a few weak points. Artillery preparations usually only lasted ten to fifteen minutes. This is not long enough to do any serious damage to a defender, and since infantry virtually never followed the barrage closely enough, the attackers did not catch defenders sheltering in dug-outs.[173] If the artillery is merely going to warn the enemy, it should not be fired. In fact, Germans usually moved up close to friendly lines during shelling to avoid its effects. Few records of good counterbattery fire stand out, and one should recall that German indirect fires caused 75% of all U.S casualties. German artillery once reacted so strongly to a ten-minute artillery preparation that U.S commanders called off their attack to await an anticipated counterattack.[174]

Artillery successes stand out more than failures during Bocage fighting. One excellent aspect was the use of light planes for artillery spotting and control. Some

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[172] For more specifics regarding engineer work, see Beck, Engineers 377-381.

[173] One notable exception was the 30th Infantry Division's attack on 7 July. Heavy artillery fire, a rolling barrage, well rehearsed troops and extended formations made good progress. This operation was mainly a river crossing and thus is outside the scope of this study. It does merit mentioning, however, for the emphasis on following the rolling barrage and the overall good artillery support. See Blumenson, Breakout, 94-99.

[174] For weaknesses of American artillery, see Blumenson, Breakout, pp. 42, 58, 66, and AGF Obs. Bd., ETO, Report No. 141, "German Defense in Hedgerow Terrain," 4.

accounts contend that German artillery would not fire when these planes were overhead to avoid counterbattery fires, so perhaps only the small size and the mobility of the German mortars made counterfire against them virtually impossible. Aerial observers had the height so critical to effective observation, at least when weather permitted flying. One infantry officer suggested that the liaison plane link directly with the lead ground unit and the Fire Direction Center (FDC) of an artillery unit to streamline fire requests. A particularly effective use of fires was to use "time fire" to achieve air bursting shrapnel over defenders. Attacking tanks could advance "buttoned-up" and be on top of enemy positions for accurate suppression while infantry closed up to clear the position.[175]

b. Siegfried Line

The fighting against *Westwall* positions again demonstrated the necessity of heavy artillery. Eight inch (208mm) guns and 240mm howitzers destroyed some positions by direct hits. Even a near miss by one of these shells was a significant emotional event for defenders. For direct fire, only the 155mm artillery piece assured penetration of concrete pillboxes.

Overall, the artillery preparation itself also added to deception. American units, with large numbers of artillery pieces and plentiful ammunition, fired a preparation

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[175] Artillery successes are found in Blumenson, Breakout, 58, and AGF Obs. Bd., ETO, Report No. 129, "Employment of Tanks and Infantry," 1-2. Doubler notes that Germans considered American artillery more effective than Russian artillery. Doubler, Bocage, 29. One aspect of these studies is important to note. Blumenson and Doubler use many of the AGF reports as sources, although Blumenson, with greater resources available, uses many unit reports as well. These observer reports are often phrased as suggestions, rather than direct reports, and as such can lead to some misinterpretation. A student should consult as many of the original references as possible.

across a wide front. While the penetration sector felt the heaviest pounding, the defenders could not discern the difference quickly enough to pinpoint the objective area. The preparation itself began by targeting German antiaircraft positions. Fires then went to counterbattery and then fell on defensive positions themselves.[176]

10. Air Support: The bomb carpets unrolled in great rectangles.[177]

a. Normandy

The finest air support available throughout the campaign came from the small artillery liaison planes already mentioned. The close nature of the terrain made close air support very difficult, although tactical air units did devote much effort to the problem and worked though to very effective techniques in time for COBRA. Allied air superiority did have a decisive effect on German units moving up to the front and wreaked havoc with supply lines and the like.

The key air support actually employed to break through the defensive positions was the use of heavy and medium bombers in Operation COBRA. Unfortunately, while very effective against some of the German defenders, the air attack had some tremendous errors as well. Originally, the Army Air Corps tried to bomb on the 24th of July. Bad weather forced cancellation, but not before 700 tons of bombs fell

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[176] For artillery effects on positions, see Beck, Engineers, 418, Cole, Lorraine, 584, and Staff Group A, Section 11, CGSC Class 83-84, "Huertgen Forest-Offensive, Deliberate Attack, Forest, 16 November 1944" (Fort Leavenworth, KS: Combat Studies Institute, 1984), iv-55. For more on artillery as deception and artillery targets, consult Cole, Lorraine, 591, and MacDonald, Siegfried, 253-261.

[177] General Leutnant Fritz Bayerlein, quoted in D'Este, Decision, 402.

on both Germans and Americans. American airmen killed 25 men and wounded 131 in the 30th Division. The key cause was the 8th Air Force's refusal to bomb parallel to the road marking the front lines. Apparently fearing antiaircraft fire, the bombers flew straight over friendly troops to bomb the Germans and the "creepback" that always occurred killed American ground troops in even greater numbers on the 25th.[178] Most bombs did hit German held ground and inflicted catastrophic damage on some of those units there. The commander of the *Panzer Lehr Division*, *General Leutnant* Bayerlein, reported only thirty percent of his troops remained in action and only about fifteen tanks (all from outside the target area). However, the Seventh Army after action reports reported less than ten percent of personnel casualties came from the bombardment. The truth probably lies in the middle.[179] The Americans, however, initially made little progress, the furthest penetration being only 2300 yards,[180] and at first believed the bombing did no good at all. The bombing wiped out some Germans but when the survivors realized they could still fight, the resistance surprised the Americans, who had

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[178] Official sources list 111 killed and 490 wounded, including LTG McNair, Head of Army Ground Forces. See D'Este, Decision, 401.

[179] For a low estimate of the effectiveness of the COBRA bombardment from the standpoint of killing Germans, see LTC Roy R. Stephenson, "The Impact of Massive Artillery Fires on Command, Control, and Communications in the European and North African Theaters During World War II," in Tactical Responses to Concentrated Artillery, CSI Report No. 13, (Fort Leavenworth, KS: Combat Studies Institute, [1990?]), 61-63.

[180] David Eisenhower, Eisenhower at War, 1943-1945, (New York: Random House, 1986), 350, quoted by Stephenson, "Massive Artillery", 61.

expected no German survivors.[181] The impact area also did not extend far enough behind the German lines to include most of the artillery.

b. Siegfried Line

The problems with air support continued to plague air-ground cooperation for large scale attacks. The 30th Infantry, bombed so often by friendlies that it called the Air Force the "American *Luftwaffe*," tried to convince airmen to attack perpendicularly to the front for one major assault. The airmen refused, just as in COBRA, and did not want smoke to mark the target for fear of confusing the pilots. While the infantrymen held their breath, the bombers attacked German pillboxes and other positions. Fortunately, no bombs fell short that day. Unfortunately, all bombs fell behind the Germans and many fell on Belgian civilians in a town far off target. Many Germans slept through the bombing. Dive bombers did create shell holes the attackers used for cover but did not hit a single pillbox. Napalm landed on wet forests where it made no contribution.[182]

11. C2

The development of tactics to overcome defenders in the Bocage highlighted the importance of rehearsals for American units. American units, without truly habitual relationships between the same troops of different units and fighting the individual

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[181] Those interested in more details of the first days of COBRA should consult D'Este, Decision, 400-404, and Blumenson, Breakout, 239-245.

[182] For observations of air strike effectiveness, see MacDonald, Siegfried, 260, and Charles Whiting, Bloody Aachen (New York: Stein and Day, 1976), 87-90.

replacement system as well, needed rehearsals to refine tactics and for men to learn the capabilities of their weapons. These rehearsals allowed men to work out the nuts and bolts problems of signalling between foot soldiers and tankers and radio modifications to allow commanders to talk to one another. Much detailed effort resulted once men realized that "...close coordination and complete interdependence between the infantry and tanks is of paramount importance..."[183]

A high level problem surfaced when the original bombings for COBRA did not take the form the Army believed had been agreed upon. No means existed for ground controllers to designate targets well or call off strikes once the bombs began falling short. Existing technology and procedures did not allow or force the bombers to execute tight, precise strikes. Placing the ground forces outside of the danger area (3000 yards) would not allow rapid follow up of the bombing. At this time, with these people in charge, saturation bombing could not be adequately controlled.

The compartmentalized terrain made land navigation very difficult and this in turn made fire support difficult. Officers and sergeants must know where their forces are to control them well and utilize other assets for support. Part of this stemmed also from the raw nature of the young leaders. This also contributed to the generally slow and hesitant movement of attacking units.

Interestingly, the COBRA bombardments, which seemingly had so little direct effect, illustrate the importance of defensive command and control. One possible

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[183] AGF Obs. Bd., ETO, Report No. 129, "Employment of Tanks and Infantry," 1.

explanation for the success of COBRA lies in "...the inability of the commanders to get intelligence or command orders..." which directly resulted from "...the bombardment's interdiction or disruption of the communications systems."[184] Since the Germans used wire communications extensively and relied on rapid counterattacks as well, the disruption of communications caused by the bombing and shelling had a significant impact.

12. Special Weapons/Unique Employment of Assets

a. Normandy

The close-in nature of the *Bocage* and consequent difficulty of bringing large weapons to bear upon pillboxes and buildings made flamethrowers a useful weapon. Although not universally used, engineer units in most divisions used flamethrowers to reduce especially stubborn defenders. The primary asset of flame weapons was the shock effect upon defenders. Many surrendered rapidly when faced with the prospect of burning to death.[185]

The actual destruction of pillboxes and strongpoints required distinct cooperation of various branches and some special devices which must be fabricated or assembled to assault such objectives.

> Dive bombers and artillery drove the defenders in the outer entrenchments to seek the shelter of the concrete. Then the infantry, covered by a light bombardment, advanced rapidly until they were 300 to 400 yards from their objective. From there, machine-guns and anti-tank guns directed intense fire into the embrasures while

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[184] Stephenson, "Massive Artillery," 63-64.

[185] For details of flamethrower employment, see LTC Leonard McKinney, Portable Flamethrower Operations in World War II, (Washington, D.C.: Chemical Corps Historical Office, 1949), 195-197.

demolition squads worked round to the rear of the pill-box. They then dashed in and blew down the steel door with "beehives" or "bazookas," thrust in pole charges and phosphorous grenades and left the explosives and the choking smoke to do the rest. It was a slow process, but it was sure and comparatively inexpensive.[186]

Engineers still relied on manual probing for and lifting of mines. One mechanical clearing technique that never fully succeeded still deserves notice. The "Snake" consisted of metal pipes filled with explosives and fitted end to end. Once assembled, a Sherman tank pulled up behind the pipe and men attached the "Snake" to the tank. The tank attempted to push the device into minefields where it could later be detonated from a distance. Obvious drawbacks included the need to assemble it close to the enemy and the effect of rough terrain on a long, inflexible pipe being pushed.[187]

b. Siegfried Line

The latter portion of the war saw American units copy the British lead and produce a wide range of tank variants for special purposes. These machines used Sherman tank chassis and included earth moving equipment, mine clearing equipment, gap crossing equipment, flamethrowers and rocket launchers among others. Fascine carriers had bundles of logs on a sloped frame. The vehicle could drive up to a ditch, release the bundles and partially fill the gap for other vehicles to cross. The "Ark" style machine drove itself into ditches or water. Another machine hoisted the folded ramps of

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[186] Chester Wilmot, The Struggle for Europe, (London: Collins, 1974), 375, quoted in English, Infantry, 143.

[187] For more information on the "Snake" see, Beck, Engineers, 380, and H.M. Cole, The Lorraine Campaign, United States Army in World War II: The European Theater of Operations, Volume 3. (Washington, D.C.: U.S. Army Historical Division, 1950), 271.

the "Ark" back and drove over the new "bridge." Some recovery vehicles mounted 81mm mortars to fire smoke when required.[188]

13. Historical Lessons

The first lesson relates to using large amounts of Air Force delivered ordinance directly onto fortified defensive positions. Discussion already illustrated the necessity for accurate targeting and rapid follow up by attacking ground troops. Those troops must be conditioned to expect defenders to resist and to move rapidly through gaps to strike deep. During COBRA, attacking infantry did not follow up rapidly enough, partly due to shock and casualties from fratricide. One contributing factor to the slow advance was the wide attack frontages used by the Americans. One infantry regiment attacked on a 2000 yard front over fairly open terrain. When comparing this frontage to German or Russian tactics, one can see that breakthrough attack frontages are normally much smaller. Tight frontages for units closely following a heavy saturation bombing might enable some units to suppress strongpoints while other units move freely through the zones of the heaviest damage. Records do not clearly indicate how badly the bombing churned up the ground in all sectors. Future commanders might consider leading with a tank attack such as that of the 2d Armored CCA for more rapid exploitation of the breakthrough.

At a lower level, the Bocage fighting illustrated the criticality of combining American firepower and aggressive maneuver of tightly knit tank-infantry teams. When

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[188] The Israeli Merkava tank has a 60mm mortar which is fired from inside the turret as a standard component. For more information on tank variants, see George Forty, United States Tanks of World War II in Action (Poole, England: Blandford Press: 1983), 120-123.

a unit is predominately infantry, commanders broke down units below platoon level and met success. The "assault team" was a sound concept for the decentralized "bush warfare" of the bocage fighting. Armor heavy units could keep platoon integrity, but still needed a form of the "assault team" to reduce defensive positions. Artillery must be fired very close to friendly forces to achieve the desired effect.

Another idea with great merit was the tying together a lead ground unit with a supporting artillery battery through an airborne observer. While this ties up artillery and reduces flexibility, the resulting massing of force on a small portion of the defensive positions should result in a rupture of the fortified position. With mortars also in support to use air bursts to pin defenders in their shelters, a potent force emerges. The previously mentioned difficulties with land navigation impacted upon this to a degree. Marking targets with rockets or tank fired smoke rounds would facilitate fire support accuracy.

The decentralized nature of the German command and control system was an important factor in German success. An attacker facing such a defense must tailor artillery, jamming and other means of attack on lower echelon command posts than he normally would. Destroying the ability of the key commanders, whoever they may be, to communicate their orders or receive information from subordinates will significantly increase chances of success.

Several techniques exist to improve control at lower tactical levels. These techniques help commanders in compartmentalized terrain and in night attacks where difficulty arises in locating friendly forces. If it is primarily a mounted attack, illumination rounds fired low behind the defenders during the artillery fire aids navigation.

Before the tanks open fire, a short machine-gun burst high and right will show where attackers are to avoid fratricide. Tracers are obviously necessary for this and defenders, if not already suppressed by artillery, will also see where attackers are.[189]

B. THE MARINE EXPERIENCE: CORKSCREW AND BLOWTORCH[190]

1. Terrain

Marine experiences against fortified positions took place on the many Pacific Islands where Japanese and Americans fought each other. In general, the small areas involved included either thick vegetation or virtually bare sand and coral atolls. Frequently, Marine commanders found themselves with only the option of direct frontal assault against strong prepared defenses. This section will discuss general Marine lessons throughout the war. For illustration, the author will also examine the fighting on Okinawa for the so-called Shuri Line.

2. Defender

At the lower tactical levels, Japanese soldiers displayed unsurpassed courage, tenacity, and a superb ability to construct exceptionally strong defensive positions. The Japanese determination to fight to the death made him a rare enemy. Luckily for Americans, the Japanese showed limited capacity to conduct efficient operations at higher levels. Japanese artillery possessed little fire control capability and could not mass large

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[189] Using bursts of tracer for control comes from LTC Lowell Love, "Night Fighting With Tanks," Armored Notes, Memorandum No. 5 ([?]: U.S. First Army, 17 April, 1945), 2-3.

[190] This term referred to flamethrowers burning out defensive positions, "blowtorch," and pitching satchel charges in, "corkscrew," to police up remaining defenders.

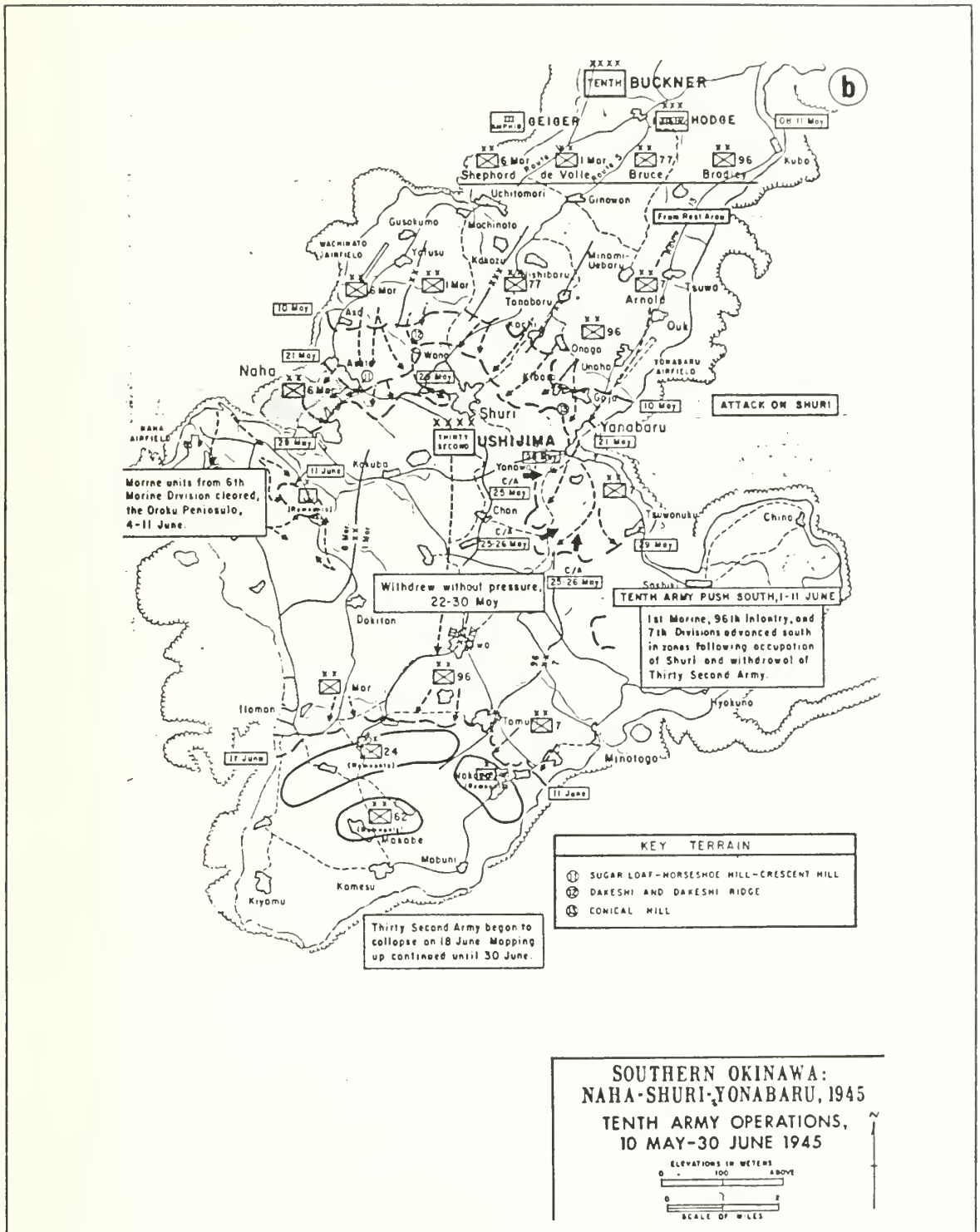

Figure 6: Okinawa (See Campaign Atlas to the Second World War: Asia and the Pacific (West Point, NY: USMA Department of History, 1981), Map 49b.)

scale fires. Each island garrison fought out its own lonely Götterdämerung bereft of any significant air or naval support.

On Okinawa, Thirty-second Army defenders under General Ushijima maximized the natural defensive strengths of the large cave network by extensive digging and fortifying. Troops concentrated on reverse slope gun positions connected by underground tunnels. The tunnels and caves held men, weapons, supplies, command posts and hospitals. The Japanese also used stone burial vaults in cemeteries as shelters and fighting positions. Soldiers sheltered underground to escape shelling and then occupied rifle pits and trenches to support the weapons emplacements which covered almost every foot of ground within the defensive sector. Obstcles and natural terrain channeled attackers into engagement areas already preregistered by artillery. Camouflage included wooden doors with dirt and vegetation on top covering the firing ports of bunkers.[191] Camouflage and reverse slope positions hindered American artillery observers in their target acquisition. A Japanese document stated,

> ...In situations where island garrisons cannot expect reinforcements of troops from rear echelons, but must carry on the battle themselves from start to finish, they should exhaust every means for securing a favorable outcome, disrupting the

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[191] For descriptions of Japanese defenses on Okinawa and overall attributes, see James and William Belote, Typhoon of Steel: The Battle for Okinawa (New York: Harper & Row, 1970), passim, Bemis M. Frank and Henry I. Shaw, Jr. Victory and Occupation: History of U.S. Marine Corps Operations in World War II, Volume V (Quantico, VA: U.S. Marine Corps, 1968), 48, 244, and Dr. Thomas M. Huber, "Japanese Counterartillery Methods on Okinawa, April-June 1945," Tactical Responses to Concentrated Artillery, CSI Report No. 13 (Fort Leavenworth, KS: Combat Studies Institute, [1990?]), 99. Note that Frank cites Japanese units with a lower case letter starting the second word (Thirty-second) and this author followed suit.

enemy's plans by inflicting maximum losses on him, and, even when the situation is hopeless, holding out in strong positions for as long as possible.[192]

3. Attackers

By the time the Marines came to Okinawa, they had learned a great many lessons in combat and their organizations and practices displayed this knowledge. Many men in the 1st and 6th Marine Divisions had combat experience, with the 1st Marines showing 205 officers on their rolls with over two years of overseas service. Knowing that casualties would dilute unit effectiveness, Marine units attached replacements to infantry units for preinvasion training. These men worked as shore party laborers until needed to replace unit casualties.

Marine unit composition, tactics and equipment also reflected combat lessons. Each squad comprised three fire teams, each built around an automatic weapon. The three fire teams gave a squad certain advantages in close combat. Two teams could suppress adjacent bunkers while the third moved forward. Every battalion supply section carried twelve flamethrowers for use as ordered. To provide trained men to use them, as well as to avoid stripping down rifle companies, each battalion included a 55-man assault platoon. This platoon had six squads which each included a squad leader, a flamethrower operator and assistant, a bazooka operator and assistant and two demolitions men.

Earlier fighting on New Georgia taught the Marines that infantry needed heavier tank support and tank-mounted flamethrowers. Man-portable flamethrowers had

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[192] "Land Defense Doctrine (Provisional), dtd 1Dec44," in CinCPac-CinCPOA Bul 147-45, Translations and Interrogations No. 32, dtd 16Jun45, p. 4, quoted by Frank, Victory, 48.

large silhouettes and made movement through rough terrain difficult. Heavy casualties among operators drove the decision to develop tank-mounted weapons. On Okinawa, units had the Army H1 Flamethrowing tank, a modified M4 Sherman. It carried 290 gallons of fuel, had a range of 60-80 yards and a burn time of two and one half minutes. After the experience of Tarawa, Marines put strong emphasis on thorough coordination of tanks, artillery, infantry, flamethrowers and demolitions to kill Japanese in fortified positions. Units also trained all Marines in demolitions.[193]

4. Narrative

Mid to late May, 1945, saw two of the bloodiest weeks of fighting during the Okinawa campaign. Japanese defenders held the Shuri line as Marines and Army troops tried to drive south and break the stubborn resistance. Rough terrain, strengthened by intensive Japanese efforts, offered no indirect approaches and exposed attackers to automatic weapons fire and indirect artillery and mortar fires. The defensive tunnel complex allowed shifting of reserves in some areas.

The constraining terrain limited Marine options. Each day saw vicious fighting and mounting casualties. Intensive barrages of 16-inch naval guns, artillery, aerial bombs and mortars tried to pin defenders inside the caves so that attackers could win the "race to the parapets." Tank-infantry assaults, usually including flamethrowers and demolitions teams, burned and blasted their way forward. Depleted units clawed onto the objectives and as often as not engaged in grenade duels and hand-to-hand fighting with defenders.

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[193] For more thorough examination of Marine organization, equipment and tactics, see Frank Victory, 389, 700-720.

Defenders used all available weapons, including some direct 150mm howitzer fire against tanks. Night saw digging in and consolidation as units brought up more men and ammunition to continue the brutal killing the next day. An 18 May 1st Marine division report summed it all up, "gains were measured by yards won, lost, then won again."[194]

The Japanese fought on under the terrible pounding. Each night they tried to repair and recamouflage positions damaged during the day, or build new ones. Heavy rain fell from 21-30 May, miring supply vehicles and making life generally miserable. General Ushijima began withdrawing the bulk of his forces to positions further south and left a rear guard to fight on. This period saw American success on the flanks and some very successful night assaults as well. In the end, however, Ushijima escaped the attempted double envelopment and saved most of his forces for later fighting south of the Shuri line.[195]

5. Use of Intelligence/Patrolling

No accounts found by this author mention very much concerning intelligence. Since the defenders occupied caves and dug in positions, most communications went over wires or by messenger. The excellent concealment and camouflage offered little to photographic interpreters or observers. Patrolling occurred, but in the constricted terrain these patrols usually learned of enemy positions by drawing fire.

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[194] 1st MarDiv SAR, pt VII, p. 6, quoted in Frank, Victory, 261.

[195] The overall narrative of fighting for the Shuri line is paraphrased from Frank, Victory, 240-287, 384.

6. Use of Obscuration/Smoke

Artillery and mortar delivered smoke is rarely mentioned directly, as artillery fires are repeatedly described as heavy, massive or the like. Authors cite the weight of shells fired without detailing the type of ordnance. One instance is documented. On 16 May, 1/7 Marines (1st Battalion, 7th Marine Regiment) used 107mm and 81mm mortars to smoke the area in front of their positions in conjunction with other artillery fire as a feint. The defenders did not react and the preparatory fires continued after a pause to bombard the enemy for a later attack. This author concludes that Marines did use smoke more than this, or else its use for a feint would not be believable. Given that so much high explosive did so little damage, firing smoke would have been well worth the effort to carry it forward if it reduced the accuracy of defensive fires. Smoke grenades saw very useful service reducing enemy positions. As suppressive fires covered the demolition team's move forward, a man would throw a smoke grenade into the opening to blind defenders and detect other openings, air vents and the like. Smoke grenades also gave concealment as men moved forward to place the satchel charges.[196]

Throughout this period, Marine commanders began to use the welcome cloak of darkness to screen their movements. A total of approximately twenty-one night patrols and attacks occurred on Okinawa. The Amphibious Reconnaissance Battalion, perhaps composed of somewhat more enterprising and homicidal individuals than regular line units, conducted thirteen of these.

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[196] For an excellent account of Marines reducing a large cave position, see McKinney, Flamethrower, 164-165.

> All night operations were...performed in an orthodox manner...In every case surprise was achieved and the night attack or movement was successful.

A Japanese Colonel Yahara described them as,

> ...particularly effective, taking the Japanese completely by surprise. The Japanese had so accustomed themselves to ceasing organized hostilities at nightfall, and...reorganizing and relaxing during the night that attacks in these hours caught them both physically and psychologically off-guard.[197]

7. Tank/Infantry Cooperation

Throughout the latter stages of the war, Marine tankers and infantry displayed superb cooperation, motivated by mutual survival. Marines had learned that "processing" enemy positions paid off. Tanks would blaze away at designated positions to enable infantry to work up close with demolitions. Of course, since war is unpredictable, results varied from day to day. At times Japanese would come out in the open and tankers "...blew them all over the landscape." Protecting infantry might get lucky and directly hit and detonate the satchel charges carried by suicide teams, with terminally effective results. Against effective antitank support and if the infantry could not advance, tanks suffered terribly. One assault on Kakazu village resulted in a tank-pure assault. The Japanese knocked out twenty-two of thirty tanks.[198] Overall, tank losses by the end of May reached 221, including 12 of the precious flame tanks.[199]

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[197] Discussion and opinions of night attacks comes from Frank, Victory, 387-388.

[198] These accounts of tank-infantry cooperation come from Belote, Typhoon, 199, 250-251.

[199] Gordon Warner, The Okinawa War (Okinawa: Ikemiya Shokai, 1985). 117.

Against the ferocious and skillful resistance of the Japanese, only carefully combined tank, infantry and engineer assaults stood a chance of advancing. Accounts of the fighting are a virtually monotonous litany of "...tank fire, flame, and demolitions...temporarily subdued the Japanese...and enabled companies...to advance..."[200] The tanks always attracted a great deal of direct and indirect fire attention, so the infantry often covered tankers against suicide demolitions teams with long range fire when open terrain permitted. To gain an appreciation for the ratio of tanks to infantry, consider that some attacks saw fifteen tanks, two of them flamethrowers, supporting one infantry battalion and thirty tanks, four of them flamethrowers, supported another rifle battalion. That is virtually one half or one complete tank battalion supporting a rifle battalion for particularly tough defenses.[201]

Commanders on both sides recognized the criticality of the portable firepower and protection afforded by the tank. Marine General Sheperd of the 6th Marines singled out armor as "...having contributed more than any others during the progress of the campaign...". General Ushijima's Thirty-second Army published a battle lesson noting,

> ...the enemy's power lies in his tanks. It has become obvious that our general battle against the American forces is a battle against their M-1 [rifle] and their M-4 tanks.[202]

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[200] Frank, Victory, 250

[201] These examples of specific actions come from Frank, Victory, 259-260.

[202] Frank, Victory, 386.

Throughout the long course of the Pacific war, Marines developed most of the same techniques Army units adopted. Reducing strongpoints called for close artillery-tank-infantry cooperation at a minimum and often added demolition men and flamethrowers. This came to be known as "corkscrew and blowtorch." Rapid assaults on the heels of the last artillery rounds saved lives. Tankers installed field telephones on their rear fenders so that infantrymen could patch into the vehicle intercom and direct fires for the buttoned-up crews. Armor crewmen also countered the feared Japanese magnetic mine by covering vulnerable flat surfaces with oak planking.

On Okinawa, regular and flame tanks tried where possible to roam ahead of the infantry by hundreds of yards to blast and burn enemy positions at point blank range. As the terrain worsened into numerous draws and valleys the infantry had to first seize the high ground to cover engineers clearing mines. Once tanks could move forward, the tank-infantry teams worked down both sides. "Each cave position is attacked by fire until neutralized, then burned out with flamethrowers, and eventually sealed by demolitions."[203]

8. Engineers

Engineer work consisted mostly of clearing mines to allow the tanks to move forward as previously mentioned. Besides the normal probing methods, accounts exist of two innovative clearing techniques. One infantry sergeant crawled into an

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[203] Major General Pedro A. del Valle, "Cave Warfare," Marine Corps Gazette volume 29, No. 7, (July 1945), 58, quoted in Frank, Victory, 726. For more detail on the cited aspects of tank-infantry fighting, see Frank, Victory, 720-725.

antipersonnel minefield to detonate mines with submachine-gun fire. An infantry battalion laid seven tons of bangalore torpedoes in the ruts a tank tread would go through and detonated them. If there were mines, the bangalores apparently worked. Some engineers accompanied infantry platoons to operate the flamethrowers and set demolitions.[204]

9. Artillery

Despite prodigious quantities of shells fired, actual killing was limited, perhaps as little as one dead Japanese for every one hundred shells. The greatest effect of indirect fire was to drive exposed troops inside or kill them, which allowed tanks and infantry to overrun and seal up tunnel entrances and caves. The Japanese had to leave some number of troops out in trenches and rifle pits to guard the cave mouths and tunnel entrances. If these men survived the artillery, they tried to hold off the Marines until troops below could reinforce them. If the artillery and ground units timed the assault correctly, the artillery would get the infantry close enough to kill those above and trap other defenders underground. Apparently, only the 8 inch howitzer's 200 pound shell could penetrate the Japanese caves and pillboxes. Unfortunately, these weapons arrived late in the battle and with limited ammunition.

Direct fire artillery had much greater effect when the weapons could bear on a pillbox or similar position. The M-7 self-propelled 105mm gun answered many calls to move up and use direct lay against positions. Smaller caliber weapons would engage

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[204] Details of field expedient mine clearing comes from Belote, Typhoon, 179, 256. More traditional engineer work is described by Frank, Victory, 262.

the target to identify it for larger guns. In many instances, only the direct fire of the heaviest artillery weapons available could knock out some Japanese positions.

To add exceptional weight to preattack bombardments and defensive fires, Marine artillery and naval planners assigned two ships to each frontline regiment throughout the campaign. One ship provided illumination and the other high explosive fire. Fire support ships performed the same missions throughout and so fire support continually improved. During exceptionally tough fighting, some battalions had one destroyer in direct support. Possibly the ultimate tactical support from naval gunfire came on 16 May when the battleship USS Colorado destroyed two Japanese antitank guns.[205]

10. Air Support

Air strikes added weight to the artillery bombardments which tried to soften up defenders. Whenever weather permitted, aircraft flew close air support, but no clear effects emerge for two reasons. First, since the strikes augmented artillery fire, assessing which did what damage was impossible. Secondly, with the Japanese occupying caves and tunnels, a pilot could rarely pick out a specific target and assess effectiveness. Aircraft probably helped hit reverse slope positions, but no available sources address the question in detail. Planes also airdropped supplies to forward troops on occasion as well as acting as artillery forward observers.

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[205] Artillery and naval gunfire information is summarized from, Huber, "Japanese Counterartillery," 100-101, Belote, Typhoon, 179 and 195, Warner, Okinawa, 93, and Frank, Victory, 260, 384-386 and 725.

11. C2

The close in nature of the fighting, the virtual impossibility of infiltration by Americans and the aggressive leadership of Marine officers meant that commanders could usually observe their units and used no exceptional methods for command and control. Defensive command and control took advantage of the interconnecting tunnels to facilitate units' internal control, but the incessant American shelling took its toll of wire and runners. Thus, the higher commanders had trouble coordinating the efforts of all subordinates. Most tunnels and caves did not interconnect, so the artillery caused disruption meant hours of delay in passing messages at best. The Thirty-second Army could not coordinate subordinate actions. Japanese offensive operations had to occur at night and the difficulty of marshalling forces rapidly enough in sufficient size proved a major stumbling block.[206]

12. Special Weapons/Unique Employment of Assets

Marines loved their flame weapons, especially the tank mounted variety. These tanks used a mixture of six percent napalm and gasoline to create an effective psychological weapon from which even the Japanese sometimes fled. Men carried the new M2-2 flamethrowers into action on Okinawa. Each Marine division had 243 and they performed very well throughout. A contemporary account gives a feel for the Marines' affections for the weapon.

> The charge didn't stop the sniping so the portable flame thrower [sic] was employed. Each entrance was given a two to three second burst and a heavy

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[206] Huber, "Japanese Counterartillery," 101-103.

machine gun section 600 yards to the rear of Hill 99 had a field day shooting the Japs as they came out the top.[207]

Difficult reverse slope positions inspired one Marine unit to split open drums of napalm, roll them down the hill and ignite them with white phosphorous grenades.[208]

13. Historical Lessons

As one Marine General noted,

> No new or unusual features of infantry combat were disclosed or developed during the campaign on Okinawa which would tend to modify or annul current standard principles or doctrines.[209]

Stubborn defensive positions required good tank-infantry teamwork, demolitions and prodigious use of flame weapons to root them out. Artillery killed many of the Japanese above ground if they stayed up to defend the cave and tunnel entrances. If infantry and tanks can close on the enemy as indirect fires lift, chances of success are much higher because the attacker will catch the defender emerging from cover. Strong bunkers and caves required very large caliber weapons to reduce them, and direct fire worked best for that.

Mine clearing seemed to take many forms and various field expedient techniques worked. Night assaults took the enemy by surprise and made much greater

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[207] McKinney, Flamethrower, 166.

[208] The napalm trick did not achieve noticeable results. For this and other narratives of flame weapons, see McKinney, Flamethrower, 162-169, Belote, Typhoon, 196, and Frank, Victory, 263, 384-387.

[209] General Geiger, quoted by Frank, Victory, 387.

gains than daylight attacks over the same ground. The replacement system helped build cohesion by training men in certain units and feeding them into those same units as needed. Telephones mounted on tanks were crucial to allowing infantry to direct tank fires from covered locations. Smoke played a key role right down at the soldier level in screening attackers from defenders' observation and by identifying the scope of cave complexes.

VI. THE SOVIET EXPERIENCE: THE SCHOOL OF HARD KNOCKS

> Thus war, the horseman, turned back to his crimson courts and dragged brave gallants by their belts, girls by their braids, and hung small children from his saddle horns in clusters. Behind him the blind followed, stumbling with long staffs, and some way back the cripples, the armless, the half-wits, and mothers in long rows who walked alive toward Hades.
>
> *Nikos Kazantzakis: The Modern Odyssey, A Sequel, 1958*

A. INSTRUCTIONS ON THE BREAKTHROUGH OF POSITIONAL DEFENSES

An analysis of Soviet doctrine in assaulting fortified positions is extremely fruitful for two reasons. First, by learning from and against the Germans, the Soviets had to learn to overcome excellent defenses. Second, the Soviet *levée en masse* required more centralized thinking and a doctrine written out in very specific detail. Thus, Soviet published guidance is very valuable for analysis. In the summer of 1944, the General Staff of the Red Army published Instructions on the Breakthrough of Positional Defense to provide detailed guidance to subordinates at various levels on exactly how to assault fortified positions. Since the contents of this document came from years of practical experience, the techniques are battle proven and Soviet units used these tactics for the rest of the war. This chapter will examine Soviet published doctrine and its employment in two offensives: the Petsamo-Kirkenes Operation in October 1944 and AUGUST STORM, the Soviet offensive in Manchuria, August 1945.

1. Terrain

The manual applied to all types of terrain because guidance was sufficiently general. At the same time, the document dwelt on specific terrain factors in chapters covering tank-infantry tactics and selection of the geographical areas to be attacked and where friendly units formed up. Considerations used to guide the selection of the breakthrough sector were broken down by branches (infantry, artillery, etc.) and further described as requirements which must be met or should be met.[210]

2. Attacker

Each subordinate component was addressed and direct responsibilities delineated. The General Staff specified the requirements of each level (army, division, regiment, etc.) and directed close physical coordination during planning to reduce confusion. More specific examples will be covered in following sections. The reader must keep in mind that the techniques used by the Soviets relied on the tremendous numerical and materiel advantages possessed by the Red Army. The tactics, while those of a larger force, did incorporate good thinking and did not rely on costly frontal assaults. The early years of the war taught the Soviets many things.

3. Defender

The document naturally geared its guidance to defeating Germans, and since thorough knowledge of German tactics by all Soviets officers could not be assured, the

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[210] General Staff of the Red Army, Instructions on the Breakthrough of Positional Defense, translated by the Canadian Directorate of Military Intelligence, (Ottawa, Canada: Army Headquarters, 1955), 14-16.

first chapter covered German defensive organizations and techniques. The description of defenses in depth and what considerations would guide the attackers planning applied to any defense in depth. The tactics prescribed by the General Staff worked well against both the Germans and later against the Japanese.

4. Narrative

The second part of this chapter will examine the actual employment of this doctrine in two different battles against two different opponents. Specifics of those battles will be covered then.

5. Use of Intelligence/Patrolling

The General Staff stressed a thorough organization of reconnaissance as the basic precondition for a successful breakthrough of deeply echeloned continuous positions. Reconnaissance from a variety of sources overlapped to give a complete and thorough picture of enemy defenses and constituted every commander's most important duty. These sources included aerial, direct observation, artillery, armored, engineer, signal reconnaissance and finally a reconnaissance in force to confirm the knowledge gathered by other means.

Within aerial means, the Soviets ranked aerial photography as the principle method and stressed that it must occur at various times during the day. Constant visual observation, if correctly organized, provided invaluable data. This ground observation had specific tasks, primarily to find obstacles and antitank weapons. Artillery reconnaissance sought out defending artillery and mortar groupings and exact locations for all targets.

The General Staff stressed that all commanders of all arms would conduct joint observation of the terrain with their subordinates. Armored commanders used aerial photographs and other sources to study enemy antitank defenses and the best avenues for their own tanks. Engineers used other branches' information and sent small scouting teams deep into the enemy positions for first hand information. Signal units gathered data to plot the locations of enemy command posts for targeting. All arms joined in supporting the reconnaissance in force, which was conducted in a divisional breakthrough zone by an infantry battalion, one or two engineer platoons, supporting artillery and tanks under cover of smoke when practical.[211]

6. Use of Obscuration/Smoke

In the assault, attacking forces used two different types of smoke screens. Blinding smoke fell directly on the enemy and camouflaging smoke was laid between the attackers and defenders or within the depth of attacking forces. Troops used several different means to generate the smoke: smoke grenades and pots, artillery and mortar smoke shells, aircraft mounted smoke dispensers, aerial smoke bombs and by smoke generators.

Guidance stressed producing smoke along a front two to three times wider than the attack frontage. A screen of this width would hopefully blind enemy observers and direct fire weapons, confuse the enemy as to the main thrust, and prevent defenders firing into the flanks of the assaulting troops. The Staff suggested laying smoke screens on

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[211] For all the considerations of intelligence gathering, see Red Army Staff, Instructions, 6-14.

separate sectors of the front with intervals between the screens. Such a method supported three goals: creating infiltration corridors, degrading defensive interlocking fires, and economizing assets to allow a wider front to be smoked. The regulation dedicated two of four appendices to tables of required amounts of various shells to create various screens.

7. Tank/Infantry Cooperation

The Soviets considered armor to be primarily "close-infantry-support" during the "breakthrough of positional defense." Later exploitation of the breakthrough used tanks as the central arm.

> In a breakthrough operation, tanks and SP artillery constitute one of the decisive means...enabling the infantry to push impetuously through the entire depth of the enemy's main defense zone.[212]

Commanders ordered tank units to clear lanes through wire obstacles and knock out heavy weapons blocking the infantry. Orders stressed close cooperation between tanks, infantry and engineers. Preferably, tanks moved forward in two waves. Medium and minesweeping tanks led, followed by a second echelon of heavy tanks, SP guns and flamethrower tanks 100 to 400 meters behind for support. This second echelon also supported the infantry and stayed within 200 meters of the infantry. If terrain or obstacles required it, infantry lead with the tanks and SP guns mixed in with them.[213]

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[212] Red Army Staff, Instructions, 35-36.

[213] Red Army Staff, Instructions, 35-38.

Leading infantry units formed assault groups, reinforced by tanks or SP guns and engineers to destroy specific strongpoints.[214] While the document mentions assault groups several times, the composition is very unclear. Later study of the battles will clarify this important point. Oddly, the instructions do not discuss infiltration into enemy positions by combat elements, even though this routinely occurred.

For the actual assault, forces were to be entrenched in "jumping-off trenches" very close to the enemy. As the artillery and air preparation neared a close, direct fire weapons opened up for 10-15 minutes. The infantry then made final weapons checks, readied assault ladders, demolition charges and the like and steeled themselves for the ordeal ahead. Commanders ordered men to fire continuously while advancing under cover of oblique fire from their direct fire heavy weapons. Tanks fired through gaps between friendlies to suppress deeper defenses. The General Staff emphasized that leading elements kept moving rapidly and left stubborn resistance to second echelon units.

> Enemy dug-outs and other structures are showered with grenades and bottles filled with inflammable substances. Their enemy garrison is burned out by jets of flame projected by portable flame-throwers or flame-thrower tanks.[215]

Although the Soviets stressed the primacy of infantry during the breakthrough, close work between all branches was required.[216]

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[214] For discussion of assault groups, see Red Army Staff, Instructions, 37 and 61.

[215] Red Army Staff, Instructions, 62

[216] For details of tank-infantry cooperation and the conduct of the attack itself, see Red Army Staff, Instructions, 57-65.

8. Engineers

Of all those whose lives which might be nasty, brutish and short, the engineers rank first. During the preparation phase, some went deep as scouting elements. Planning staffs also ordered engineers to prepare the jumping-off positions of complexity including positions for all infantry, tanks, artillery and the like. The jumping-off trench would include myriad items such as,

> ...storage places for engineer equipment earmarked for the crossing of obstacles by the infantry, tanks and artillery as well as for the consolidation of the terrain (assault ladders and bridges, fascines, mats, knife-rests, sandbags, pointers indicating the location of passages through obstacles etc.), ladders, ramps and steps for going over the top when the attack begins.[217]

Most important of all, the Red Army Staff expected engineers to clear obstacles in the zone of attack. The actual goal was to lift all mines in the main sectors, and if that could not be done, two to three passages per attacking rifle or tank company were to be cleared.

The engineers' role did not end when the attack began. Obstacles near key enemy positions required the engineers to emplace demolitions the night before and set them off when the artillery fire began. Special assault-sapper units accompanied tanks and infantry to clear obstacles and assist in reducing strongpoints. These detachments might carry flamethrowers and have flamethrower tanks and SP guns attached to them.[218] Soviet engineers apparently rarely suffered from boredom.

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[217] Red Army Staff, Instructions, 43.

[218] For details of engineer duties, equipment and the like, see Red Army Staff, Instructions, 39-46.

9. Artillery

Soviet planners believed that a successful assault was "based chiefly on the neutralization of this defense by artillery and mortar fire."[219] Interestingly, counterbattery fire, while included, was not the highest priority.

> The principal tasks...are to inflict heavy damage on enemy personnel and fire weapons located in the main defense zone...neutralize artillery and mortar batteries and blast passages through anti-personnel and anti-tank obstacles. It is most important in this connection that enemy fire weapons and personnel...should be neutralized simultaneously throughout that position's entire depth.[220]

Guidance to artillery units was quite specific and lengthy so only some salient points will be examined here.

The Soviets believed that artillery groups should stay as close as possible to the combined arms formations and units they supported, since the sole purpose of the artillery was to facilitate the advance of those units. Towards that end, a portion of all available guns was detailed for direct fire to destroy enemy pill-boxes, dug-outs, strongpoints and buildings and clear lanes in wire obstacles. A battery of guns reinforced each rifle battalion and accompanied it throughout the depth of the defenses.

Indirect fire concentrated on destroying key parts of the defensive fortifications and obstacles. Soviet artillery also sought to clear sectors of minefields. A creeping barrage led the attacking units when possible. Such a barrage required five to six batteries for every one kilometer of front width. The barrage would pause for

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[219] Red Army Staff, Instructions, 21.

[220] Red Army Staff, Instructions, 25.

concentrated effort on known positions before the infantry and tanks conducted a close assault.[221] Regulations required artillery forward observers to accompany units within the battle formation, riding in armored vehicles equipped with radios. Air liaison officers co-located with ground unit headquarters.[222] Apparently air controllers did not conduct any terminal guidance for pilots.

10. Air Support

The air role in assaulting a fortified position was straightforward. During the preparatory phase, Soviet air units tried to gain air superiority over friendly and enemy positions. During the assault, the Red Air Force emphasized close support by attacking defensive positions and artillery units, especially those on reverse slopes. Aircraft also sought to prevent reserves from joining the battle and fought to maintain aerial supremacy. The Red Army General Staff believed,

> The most important conditions for the successful employment of the air force in battle are: the concentration of the air effort in a narrow sector on the most important targets defined with exactitude on the terrain and the uninterruptedness of that effort.[223]

11. C2

Extremely centralized planning characterized Soviet breakthrough planning. While this exceptionally rigid structure had many defects, the writing out of all required

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[221] For details of the artillery role, see Red Army Staff, Instructions, 21-30.

[222] Red Army Staff, Instructions, 54.

[223] For more information concerning air missions, see Red Army Staff, Instructions, 31-35.

tasks in this manual brings out several excellent points any attacker must consider. First, the commander defined the general aim and intention of the battle. Second, he organized all his subordinate units, defined their zones and planned their employment. For his own command and control of the battle, he planned,

> ...organization of tactical control (selection of command and observation posts in the jumping-off place and their displacement in the course of the battle, organization of communications, working out of uniform orienting points and signals etc.[224]

Planning covered an exhaustive list which serves as a useful checklist to any commander. Throughout all planning, the Soviets kept in mind that their goal was a breakthrough, and tailored all work towards the overall objective.[225]

Since the Red Army had far fewer radios than other armies, signal flares and other visual signals assumed great importance. Visual signals coordinated action between units at lower levels and marked locations of front lines for air strikes. Written guidance repeatedly emphasized that commanders had to ensure units possessed adequate amounts of signal flares and that designated men knew and watched for signals.[226]

12. Special Weapons/Unique Employment of Assets

Soviet staff guidance placed exceptional emphasis on reconnaissance gathering by all possible means. By ordering all the various branches to conduct their own types

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[224] Red Army Staff, Instructions, 17.

[225] Command and control considerations are scattered throughout the document. For the major ones cited here, see Red Army Staff, Instructions, 16-17.

[226] Red Army Staff, Instructions, 54.

of reconnaissance, or to interpret existing information from their perspective, the General Staff did its best to insure that nothing "fell through the cracks." Long range engineer scouting, if done well, would give valuable data on rearward enemy positions and general trafficability. This might influence where a commander wanted to get his forces, and thus from where they would start.

Artillery was employed in various unique ways to conform to these regulations. A very large percentage of total guns available were deployed in the direct fire role, where their accuracy is much greater. Also, one sees the concept of a dedicated battery in use here, one battery per rifle battalion. One of the key roles for artillery operating in the indirect mode was to blast paths through obstacles, such as minefields and wire. Note the heavy concentrations of fire this would require.

The Soviets attached great importance to flame weapons of all types, both man-portable and tank mounted. The amount of space devoted to emphasizing flame weapons shows that these weapons obviously made a significant impression on certain participants, such as bunker occupants.

B. THEORY INTO PRACTICE

When put to the acid test of combat, the General Staff instructions came out well. Soviet units followed the overall instructions with some changes and met success fighting both Germans and Japanese.

1. Terrain

The two battles examined occurred in the very different terrain of eastern Manchuria and near the Norwegian-Soviet border above the Arctic Circle.

a. Manchuria

Fighting in Manchuria occurred in Japanese fortified areas astride relatively open terrain of river valleys and the like. These areas formed the most accessible routes for movement, since other areas on the flanks consisted of dense forests and mountainous areas. The areas used by the Japanese for defensive fortifications consisted of hills covered with vegetation ranging from sparse to heavily wooded. The rivers themselves played no real role in the fighting.[227]

b. Petsamo-Kirkenes

Fighting here took place 200 miles above the Arctic Circle. The coastal region consisted of tundra and a few bare moss covered hills. Further inland, ground becomes rock-strewn and very hilly. During the October fighting, temperatures ranged between 23 and 41 degrees Fahrenheit. Daylight went from thirteen hours each day to ten within thirty days as winter approached. Streams, swamps and lakes made movement difficult and heavy fog coupled with frequent precipitation reduced visibility and took a

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[227] LTC David M. Glantz, August Storm: Soviet Tactical and Operational Combat in Manchuria, 1945, Leavenworth Papers No. 8. (Fort Leavenworth, KS: Combat Studies Institute, 1983), 7, 11, 19. For the specific passages describing the Hutou fortified region, see Dr. Edward Drea, "Reduction of a Fortified Region", chap. in August Storm: Soviet Tactical and Operational Combat in Manchuria, 1945, Leavenworth Papers No. 8. (Fort Leavenworth, KS: Combat Studies Institute, 1983), 104-105.

Figure 7: Manchuria (See Glantz, August Storm, 2)

toll on soldiers.[228]

2. Attackers

Both of these operations, occurring late in the war, included attacking commanders with wartime experience. Staff work also showed the lessons of a long and bloody war.

a. Manchuria

The Soviet 5th Army deployed from East Prussia in overwhelming strength. A complete listing of forces takes several pages, but the force included all arms in great quantity. Units deployed in secret, practiced with weapons and studied Japanese defenses. Officers with experience assaulting German positions briefed officers of forces already facing the Japanese. When allocating attack frontages, General Krylov could assign frontages in breakthrough sectors as small as 1.1 kilometers for a rifle division. This allowed massing 250 guns/mortars per kilometer and thirty tanks or SP guns in that same kilometer.[229]

The Soviet 35th Army faced the defenders of Hutou, the most complex strongpoint in Manchuria. The Soviets here needed to get through the deeply echeloned defenses quickly to make the Japanese fail in their goal of delaying and interdicting the

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[228] Major James F. Gebhardt, The Petsamo-Kirkenes Operation: Soviet Breakthrough and Pursuit in the Arctic, October 1944, Leavenworth Paper No. 17, (Fort Leavenworth, KS: Combat Studies Institute, 1989), 4-5.

[229] Glantz, August Storm, 13-16.

flamethrowers as they seared out and sealed up the defenders.[237] The following passage describes Soviet organization in the Hutou area.

> To reduce the Japanese fortifications the Soviets formed assault groups from the attached combat engineer battalion and the forward rifle companies of the division's first echelon battalions...These assault groups would infiltrate and reduce the Japanese positions. The division assault groups consisted of a rifle platoon with a field engineer unit and an antitank squad, one or two tanks or self-propelled artillery mounts, two machine gun squads, and two manpack flamethrower crews...[238]

b. Petsamo-Kirkenes

This front used much smaller assault teams, possibly because of the narrower frontage, the smaller size of German strongpoints and the more difficult supply situation.

> To remove German obstacles and destroy reinforced positions, the Soviets created assault groups and obstacle detachments within first-echelon infantry units. An assault group usually consisted of a specially trained rifle platoon reinforced with a heavy machine gun or two engineer squads. A rifle battalion would have one such composite platoon.[239]

8. Engineers

Red Army engineers performed yeoman service in these fights. The first part of this chapter listed the vast array of tasks demanded of engineers. The sappers did all that others expected of them.

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[237] For good descriptions of the tactical coordination and the highly exciting life of combat troops in this fighting, see Glantz, August Storm, 20-29, and Drea, "Reduction," 122-123.

[238] Drea, "Reduction", 116.

[239] Gebhardt, Petsamo, 22.

a. Manchuria

Engineer-sapper units formed key components of the more than one hundred assault groups of the Soviet 5th Army reducing fortified positions. Every first echelon rifle company had two obstacle clearing detachments to speed its movement. One rifle battalion, with from one to three engineer platoons, followed each rifle regiment to insure routes could carry artillery, supplies and reinforcements forward. Some engineer battalions, with tank support, fought by themselves to clear minefields and destroy Japanese pillboxes and other positions.[240] Further eastward around Hutou,

> Obstacle clearing groups included three or four machine gunners and three or four combat engineers equipped with mine detectors, prodders, two bangalore torpedoes, clippers, and compasses. Each first echelon rifle company had two such groups.[241]

b. Petsamo-Kirkenes

With terrain and weather as the toughest defenders, engineering efforts in the far north mainly comprised road repair and building, river crossing and similar efforts aimed at supporting the logistical efforts needed to keep the fighting going. The long range engineer elements won praise from the Karelian Front commander, who noted that,

> ...sappers controlled the roads, blew up bridges, and destroyed telephone lines, causing disorder in the work of German rear services. Finally, on more than one

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[240] To learn more about Soviet engineers, see Glantz, August Storm, 20-25.

[241] Drea, "Reduction," 116.

occasion, they directed our close air and bomber aviation to concentrations of enemy troops.[242]

9. Artillery

Artillery planning closely followed General Staff guidance. Several factors kept the gunners from playing as great a role as usual, but indirect fires still made critical contributions.

a. Manchuria

Since the declaration of war closely coincided with the first infiltration of Manchuria proper, little patrolling or aerial reconnaissance took place. This gave less than adequate precision for an intelligence product capable of driving good preparatory fires, and the Soviets chose not to fire artillery, except in Hutou. Surprise paid as good or better dividends than the use of artillery. This is especially true considering that the Japanese, not expecting an attack, only manned about one third of their positions at night. If the defenders expected an attack and pulled back most of their forces to escape artillery fires, the same result would probably have occurred. Heavy rains in western Manchuria, which cloaked the infiltrating infantry and accompanying tanks, also softened the ground and made artillery less effective.

In the Hutou area, artillery fired as planned. The artillery did not cause many casualties, but unprotected means of communications suffered severely. This precluded the higher headquarters from understanding the situation and thus influencing it. Overall, fighting in this area became primarily a methodical reduction of the

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[242] Marshal Meretskov, quoted by Gebhardt, Petsamo, 107.

individual fortifications. Remember that the 4th BGU was understrength and very inexperienced. Troops of this type inside strong concrete and steel pillboxes took counsel of their fears. Heavy shelling pinned them inside the pillboxes while assault teams moved in close. As the artillery lifted, the Japanese could not "win the race to the parapets" because the Soviet attackers had crept up and now had tanks and SP guns firing onto the trenches and firing apertures of the positions.[243]

b. Petsamo-Kirkenes

The poor road network and relatively narrow strip of land providing any decent trafficability at all limited the amount of armor used and made artillery more important to both sides. This prompted typically detailed planning which included counterbattery fires.

> ...Counterbattery fires were planned on the basis of "instrumental reconnaissance" conducted during the preparatory period. Forty-three Soviet batteries were targeted on the twenty-one German batteries that were plotted in this manner, a ratio of 2 to 1. A counterbattery mission would be 3 to 5 minutes of fire, achieving a density of 25 to 30 rounds per hectare (an area 100 meters square) or 2,500 to 3,000 rounds per square kilometer. Counterbattery fires-a combination of mortar and artillery units firing 200 rounds per German battery-were to suppress German mortar batteries in the zone of the main attack.[244]

Planning directed at least 8200 rounds of Katyusha rocket projectiles hit selected German strongpoints. The terrain restrictions also meant that most artillery fired in the indirect mode and fewer than normal guns used direct fire to support advancing infantry.

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[243] For details relevant to artillery in Manchurian fighting, see Drea, "Reduction," 110-121, and Glantz, August Storm, 17-19.

[244] Gebhardt, Petsamo, 18-19.

Counterbattery fire ranked first in priority, followed by suppression of positions and then the blasting open of lanes through obstacles. Following the preparation fires, a quick transition followed to successive concentrations of fire to support the infantry advance.

> Under this system, the direct support indirect-fire assets were to concentrate their fires on successive lines immediately in front of the attacking troops, shifting their fires forward as the attack advanced. The 82-mm and 120-mm mortars were to fire successive volleys, each 150 meters beyond the previous volley.[245]

Unfortunately, the ground fog and inaccuracies of "instrumental reconnaissance" degraded the artillery's effectiveness and attacking troops did not make as rapid an advance as hoped for. On the second day, forward troops moved beyond the range of artillery and close air took over as the primary source of portable firepower.[246]

10. Air Support

Aviation units performed the roles that the Red Army Staff set down for them. For different reasons, their activities in these battles did not amount to nearly as much as any planners expected. Weather kept aircraft grounded in western Manchuria and in the northern USSR. Only in the Hutou area of Manchuria did the air assets have much effect, and there they just added weight to artillery fire that was already probably heavy enough. The first meaningful air attacks above the Arctic Circle happened days after the fighting

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[245] Gebhardt, Petsamo, 19.

[246] For discussions of Soviet artillery planning and execution, see Gebhardt, Petsamo, 17-19, 31.

began and did cut much of the German wire communication. Few other examples of air support exist.

11. C2

Lower level tactical Soviet units did not have the plethora of radios used by modern forces nor even numbers close to those of their opponents. With forward elements making different rates of progress forward and defensive positions holding on throughout the battlefield, communicating to other units, headquarters and supporting arms was a key problem. Visual signals such as flares, while having some drawbacks, held several advantages as well. In the confusion of close quarter fighting, flares indicated friendly positions with certainty and avoided any map reading errors. Flares fired at the enemy assisted supporting guns or tanks to bring fire to bear quickly.

The control of artillery fires was critical to assaults of this nature. With so many missions, the Soviet answer was to mass enough guns to perform all the missions, and to prioritize those missions. No solution surfaced for controlling fires to avoid friendly infiltrating troops. The streamlined infantry-artillery relationships coupled with direct fire simplified artillery support.

Long periods of training gave units time to iron out problems face to face. This working out was necessary for units such as Soviet which use individual replacements or have high turnover for various reasons including the taking of casualties. The huge numbers of engineers required puts far more engineer units into the equation than other operations would and requires changes to higher unit organizations to adjust

to this. Such changes have many effects on command relationships, communications nets and the like. These must be ironed out and rehearsed for smooth operations.

12. Special Weapons/Unique Employment of Assets

No new weapons saw their genesis during the fighting. Several interesting pieces of information came to light concerning innovative measures taken by various units to solve problems or gain an advantage in unique ways. Study of some of these proves illuminating and supports the old adage, "If you ain't cheatin', you ain't tryin'."

a. Manchuria

Soviet border guard detachments spent the entire period from 1941-1945 watching the Japanese across the border and knew the terrain intimately. Lieutenant General Zakhatayev, commanding the Soviet 35th Army took full advantage of this asset and used it well. Border guards crossed the Ussuri River first and occupied empty positions or subdued any defenders before regular combat elements moved through. They also guided combat units through the unfamiliar terrain.[247]

b. Petsamo-Kirkenes

In the far north, with troops and supplies taking up all available space as units advanced, medical units needed to be very creative. Knowing that many wounded men would be lying in the many folds of the rocky grounds and especially low ground that could be wet and freezing cold, quick evacuation was a problem needing a solution.

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[247] Discussion of air asset utilization is scattered. For one good passage, see Drea, "Reduction," 109.

Planners decided to use dogs to detect the wounded. Sleds, litters, and some aircraft evacuated wounded but the Soviets also used reindeer as pack animals on occasion for equipment and wounded men.[248]

13. Historical Lessons

Studying Soviet methods yields many very useful lessons for the military student. The first is the value of one single document covering the special kind of planning needed to assault a fortified position. The document was by no means perfect, but heavily stressed key issues such as reconnaissance and close cooperation of tactical units. When intelligence could not give an exact picture, commanders did not hesitate to cancel artillery fires, demonstrating the degree to which intelligence should "drive the train." Without good intelligence, a force cannot, by definition, conduct a truly deliberate attack.

Tying in with that thought, one sees the value of infantry infiltration under cover of darkness. Surprise is probably the most sought after advantage a commander can hope to attain. Good defenders usually lightly garrison the forward outpost areas and let attackers expend their sound and fury there before the main event. Infiltration allows assaulting forces to take terrain at low cost and save artillery and other assets for when they will be needed more. Remember the need for portable firepower, though, and insure that tanks or at least flamethrowers and similar weapons are up front for the infantry.

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[248] Gebhardt, Petsamo, 27.

Almost all defensive positions have pillboxes, dug-outs, or some kind of shelter for the troops to hide in under artillery fire. Artillery there is best used to keep troops inside these structures instead of out in their trenches or firing pits. This means artillery must fire extremely close to friendly troops and must provide close assaulting fires while tanks, infantry and engineers clear their objectives.

Assaulting fortified positions takes enormous numbers of engineers. Even if infantry takes over all tasks of manning flamethrowers and using demolition charges on strongpoints, the continuous obstacle clearing and then the repair or creation of routes through the devastated areas will require massive amounts of engineer labor. The enormous amounts of materiel, especially the artillery displacing forward, will require routes and cleared areas.

VII. THE NATIONAL TRAINING CENTER EXPERIENCE: DO WE TRAIN AS WE SHALL FIGHT?

> I am more afraid of our own mistakes than of our enemies' designs.
> *Pericles: Speech to the Athenians, 432 B.C.*

> I am not sorry that I went, not understanding what has happened. One may pick up something useful from the most fatal errors.
> *James Wolfe: Of the Rochefort expedition, 1757*

A. BACKGROUND

Armor, mechanized infantry, and occasionally cavalry and light infantry units rotate through the U.S. Army's National Training Center (NTC) at Fort Irwin, California to undergo the most realistic training currently available in peacetime. Units conduct battalion and brigade sized simulated battles against excellent, full time opposing force units universally known as the OPFOR. Both sides in these mock battles use the Multiple Integrated Laser Engagement System (MILES) to register kills on vehicles and personnel. Units also conduct live-fire exercises at battalion level, normally consisting of two defenses and one attack. During the live fire phase units use live ammunition against mechanical targets and controllers assess kills on the units through the MILES system.

Realism comes from avoiding most of the simulations used in previous maneuvers. For example, engineers actually dig tank ditches and troops dig fighting positions. When maneuvering in other training areas and especially in Germany, ditches are most often

replicated by engineer tape and time delays imposed on attacking units to replicate the time required to breach the obstacle. Units training at NTC, and other Combat Training Centers, must actually breach ditches, minefields of inert mines and wire obstacles. Codified Rules Of Engagement guide Observer/Controllers in replicating the actual capabilities of weapons such as artillery and chemical agents as closely as possible. This author will use the written results of selected training rotations, other studies which came from direct observations, interviews with the head of the NTC Observation Division and direct observations during this author's research trip to compare current training with historical lessons to see if training may be improved.

One factor the reader must keep in mind is that until very recently, training units did not face an actual fortified position of large size. Units did perform missions calling for deliberate attacks where defenders used mines, wire and entrenchments, but these varied in size and could not be compared with positions such as those at Kursk and El Alamein. However, attacking units did face defenders who had used obstacles to strengthen the defense, so training can be analyzed in the context of this thesis as long as the mentioned factors are considered. Now, a new "Samarian" style of defense is used by the OPFOR to defend against training units attacking in brigade strength.[249] This defense consists of large scale linear obstacles defended by dug-in infantry in depth behind the obstacles. Armor is normally held in reserve or dug in behind the

[249] Most brigades go through rotations with only two battalions rather than the full three.

infantry.[250] One example of this doctrine in practice saw 5200 meters of tank ditch and three layers of wire and mines behind this ditch, for a total of twenty linear kilometers of obstacles. Defenders, comprising approximately 500 men and ten tanks, occupied entrenchments in depth behind the obstacle complex.

1. Terrain

The training area of Fort Irwin consists of open, desert terrain divided up by mountains to form several large valleys. Some of these valleys merge at narrow gaps and some merge in fairly wide areas. The ground is predominately hard packed and devoid of any but sparse, ankle high vegetation. The bare, rocky mountains rise up sharply out of the desert floor. Large scale unit movement occurs in the wide valleys and through the gaps in the mountains.

2. Defenders

As noted, troop units stationed at Fort Irwin provide most of the Opposing Force. National Guard, Reserve and some Regular Army units sometimes come to the NTC, receive special training, and augment the OPFOR. Most of these units are engineers and infantry. The OPFOR has an excellent reputation, plays to win and usually does.

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[250] Captain David R. Hogg and Captain Kristian P. Thompson, "Doctrine and Tactics for the Samaran Army," NTC Special Text 91-2, (Fort Irwin, CA: National Training Center, 1990), 2-1 through 2-13.

3. Attackers: Process over Product?

Most training units are armored or mechanized, with an occasional cavalry or light infantry unit training on desert terrain. As mentioned, these units train in live-fire and "force-on-force" maneuver against the dedicated OPFOR. Unfortunately, current trends indicate a high number of units suffer from a "trade unionism" such as afflicted the British. Each of the training units comes with a "slice" element of supporting elements from the other branches. These support elements are not always familiar with the maneuver units they are assigned to support, and most often the maneuver unit commander is not the actual commander of these supporting elements.[251] A more fundamental aspect of American units to bear in mind, especially as compared to the Germans of WWII, is the tendency to become focused on the details of execution to far too great a degree. As described by Lieutenant Colonel Quirk, head of the NTC's Observation Division, "We worry about how we are going to do something rather than what we are going to do."[252]

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[251] The supporting elements' leaders receive their fitness ratings, critical to promotion, from their own parent commander and not the maneuver commander. Also, most units of all branches are 'plussed up' to make a full strength unit to go through an NTC rotation. These factors, along with the individual replacement system used by the U.S. Army, all work against the building of cohesion such as done in the British or German armies. Such factors should be noted, but full discussion is far beyond the scope and focus of this thesis.

[252] LTC Michael Quirk, NTC Observation Division, interview by author, 21 November, 1990. Hereafter cited as Quirk Interview.

4. Narrative

A unit will receive a mission, plan and execute that mission and then discuss the results with the Observer/ Controllers (O/Cs) in an After Action Review (AAR) to help it learn and improve as rapidly as possible. These AARs use "discovery learning" to draw out learning points from the "players" using observations from the O/Cs who accompany the units and instrumented data which compile vehicle kills, exact vehicle locations at critical times and other relevant data. O/Cs guide the discussions in a manner which helps players themselves discover the mistakes made and how those impacted upon battle outcome. Each combat vehicle, along with certain dismounted personnel, carries equipment that sends data on current location and firing to a complex known as the "Star Wars" building that shows vehicles, minefields, graphic control measures or whatever is requested as the battle progresses. With this technology, an AAR done in a mobile van a few hours after the battle for key unit leaders, can show actual positions and kills at key moments in the battle. This discussion also draws out lessons concerning artillery, engineers, electronic warfare, and anything else that effected the battle.[253] These discussions are useful because there is no predetermined event listing. Both sides are given a mission, an area and as little interference as possible. The battle outcome primarily depends on the players' actions. Following the review, the units continue preparing for the next mission for which the order has already been given.

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[253] Verbal AARs are done at platoon and company level immediately after a battle. The more technical AAR in the van is for company commanders and battalion level leaders.

5. Use of Intelligence/Patrolling

The experiences of units training at the National Training Center proves the need for good intelligence if an attack is to succeed. Overall, units that conduct good reconnaissance and develop a good intelligence picture do well and units that do not do these things well fail.[254] Good dismounted reconnaissance enhances the flow of intelligence that is the key to forming a good picture to drive planning. In eleven battles examined, this author found four of the five assaults with good intelligence succeeded.[255]

Where intelligence is concerned, the NTC reinforces valuable proven lessons. Scouting is stressed and lessons proven on the training ground have driven changes in equipment -- to improve survivability of reconnaissance elements -- and tactics, both in scouting the enemy and fighting enemy scouts. One major lesson is that training units usually do not conduct quality dismounted reconnaissance and the OPFOR does. One point recently brought out is the effectiveness of an attacker jamming defenders' radio

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[254] Reconnaissance and counter-reconnaissance experience at the NTC have had a major effect on the Army. In fact, battalion level scout platoons are being reconfigured to use wheeled vehicles instead of M3 Bradleys -- a large tracked vehicle -- to improve the stealth capability of scouts. For the primary force behind this move, see Martin Goldsmith with James Hodges, Applying the National Training Center Experience: Tactical Reconnaissance, RAND Report No. N-2628-A, (Santa Monica, CA: The RAND Corporation, 1987). Several units tested Goldsmith's suggestions and proved their validity. Conclusions regarding the importance of intelligence at NTC also come from research of battle records at Army Research Institute, Monterey, CA and the Quirk Interview.

[255] Success and winning are very relative terms, and as such are best left to the eye of the beholder. The author chose the battles examined primarily based upon very high OPFOR losses or fairly low maneuver unit (BLUEFOR) losses. Each fight also must be viewed in the context of mission accomplishment. Again, the thrust of this study is to see if units are subscribing to historical lessons in their attacks.

nets dedicated to intelligence gathering. This tactic deprives the defending commander of knowledge he needs to guide him in meeting the main attack.[256] This jamming should occur as attackers approach the fortified position and jamming can then switch to enemy command nets. Overall, NTC teaches the great value of radio intercepts, just as a study of the British 'Y' service does.

One of the major assets for learning at the NTC is the OPFOR itself. These soldiers use published Soviet doctrine to guide their actions. Earlier examination of the Soviet experience illustrated the Soviet fetish for thorough reconnaissance. The thorough OPFOR intelligence gathering, its use in driving planning and decision making, and the success of wheeled vehicles played a key role in focusing attention on the subject and forcing improvements. Dismounted reconnaissance is the key. Wheeled vehicles allow scouts to live and get into position for dismounted observation. Armored scout vehicles are usually detected and destroyed. "Gamesmanship" to some degree always exists and many soldiers stress the artificialities that may allow things to occur in training and not war. This author gives some of these arguments great credence, but good soldiers always work for any possible advantage. If some artificiality brings forth the germ of a sound idea, it should be "followed to its logical conclusion."[257]

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[256] This idea comes from Colonel Jordan, an officer currently with the NTC OPFOR. He noted its effectiveness in a unit AAR on 20 November, 1990.

[257] "Karl, a wink from a pretty girl at a party rarely results in climax, but a man would be a fool not to follow the possibility to its logical conclusion." Robert Duvall, in the movie "The Eagle Has Landed."

6. Use of Obscuration/Smoke

Overall, the use of smoke ranges from nonexistent to only marginally effective. Units rarely use smoke at all and when it is used it is in amounts too small to be of use and not in a useful position. For example, one unit which fired more smoke than most still only fired an average of two smoke missions each battle. Of the eleven assaults studied, smoke played a role of any kind in only two of them. Once it fell so near to attacking forces that its use merely confused the unit's command and control and hampered movement. The second time, smoke fell late and far out of sector. When finally shifted thirty minutes later, it fell directly on the defenders in excellent quantity and blocked from the defenders all view of the soldiers working on the breach. Unfortunately, the delay allowed the defending commander to identify the main effort and shift reserves. The artillery stopped firing smoke rounds just as the breaching force broke through and the attack failed.[258] This did illustrate a critical point, however. Smoke placed directly on defenders, given proper atmospheric conditions, will block almost all of the defenders' observation of the attackers but the attackers will have a clear view of themselves and the leading portions of the initial obstacles. This point appears to directly contradict current published doctrine that tells units to lift smoke so that they can suppress defenders with direct and indirect fire.

Other observers note similar trends. Smoke routinely falls only on the friendly side of obstacles and is not shifted as required. Engineers do not call for smoke, claiming

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[258] Personal observation of the author.

that the maneuver units held that responsibility.[259] Smoke is not sufficiently planned throughout the operation. Artillery planners underestimate the quantity of smoke rounds required for smokescreens of required density or duration. For example, a screen 1,000 meters long for 30 minutes duration delivered by a battalion mortar platoon would require 500 rounds. This platoon carries a total basic load of 528 rounds.[260] Meteorological messages from artillery channels are apparently under utilized in planning smoke missions.[261] One other problem in training is failure to request adequate amounts of smoke pots and similar portable smoke producing devices. Units then do not have enough on hand to properly train[262] and so training does not drive home the value of good smoke to soldiers. A key point to reemphasize is that smoke operations are doctrinally covered by Chemical Corps officers and even appear in structured operations orders under the Nuclear, Biological and Chemical section. None of these factors give smoke operations real world emphasis.

While rotating player units rarely use smoke, the OPFOR has purchased stock in the corporation. Deliberate attacks often see heavy smoke placed as closely on top of

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[259] Captain Joe Kopiness, "Combined Arms Assessment Team Report 88-2," (Fort Leavenworth, KS: Center for Army Lessons Learned, 1988), Observation Number 18. Hereafter all such team reports will be cited as CAAT, followed by the report number and observation number, so that this reference would read as Captain Joe Kopiness, CAAT 88-2-18.

[260] Captain Andrew Sandoy, "Minefield Breaching," Center for Army Lessons Learned Newsletter 88-2, (Fort Leavenworth, KS: U.S. Army Combined Arms Training Activity, 1988), 11.

[261] Captain S.R. Robinson, CAAT 88-2-5.

[262] Captain McClearn, CAAT 88-2-10. This deficiency probably stems from limited coordination of artillery, engineer and chemical staff officers at home station.

defenders as possible. This negates the 'stand-off' range advantage of some weapons and adds shock effect when a mass of infantry or armored vehicles emerges from a wall of smoke with its weapons on 'rock and roll.'[263]

7. Tank/Infantry Cooperation

Of eleven attacks studied, only one showed excellent tank-infantry cooperation. One company broke its tank platoon up to work under direction of the two infantry platoons. The infantry, armed with antitank Dragon missiles, would flush out or destroy OPFOR armored vehicles. If the defenders displaced, the infantry directed the tanks using colored smoke and radio so that the tanks could easily kill the repositioning vehicles. Other factors also contributed to this victory where; "The enemy's flank was now opened and excellent long range tank fires working in concert with aggressive infantry action destroyed the enemy piece by piece."[264] In this attack, tanks lead the attack and their long range fires killed many defenders, especially scouts. The close in tank-infantry teamwork came in clearing the actual defensive positions. This again proves the value of the lessons learned in the Bocage fighting in 1944. Presently, however, such breaking down of units below platoon level is very uncommon.

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[263] This term means that machine guns are set to full automatic fire and a unit or individual is putting out a heavy volume of bullets.

[264] This quote comes from the Unit Take Home Package for this unit's rotation. Permission to use this material comes with the provision that no published performance data will be linked with a specific unit. The National Training Center exists for units to train, make mistakes and learn. To preserve that freedom to err, results of training are not published as such. Since knowledge of the training rotation number would enable the unit to be identified, traditional citations of quotes cannot be given.

In four of the eleven assaults, dismounted infantry went in the night before to breach obstacles, pinpoint defenders and attack defenders in depth when the main attack started. This use of dismounted infantry is stressed in training, and this is a correct emphasis, considering the proven value of such operations by the Germans at Kursk and the Soviets in Manchuria.

8. Engineers

The most common obstacle used by defenders is a combination of surface laid mines and barbed wire, with buried mines coming into play recently. All mines, but especially buried ones, deserve the following description; "Everything that is shot or thrown at you or dropped on you in war is most unpleasant but, of all horrible devices, the most terrifying...is the land mine."[265] Of the eleven assaults examined, seven encountered obstacles, normally of the standard pattern but occasionally including a tank ditch. One of the seven assaulting forces chose to move through bad terrain to avoid all the obstacles, fell upon the enemy flank and met with success. The other six units all did some breaching. Two assaults had engineers go forward the night before with scouts and these elements did make gaps through obstacles. The OPFOR very often gets its engineers in early to attempt breaches as well. The small group could not widen these gaps or mark them well and the assaulting units met with the same problems the British did in the Highland Division minefield gaps during GOODWOOD. Only one assault showed good breaching from close integration of engineers and other arms. Most attacks

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[265] Sir William Slim, Unofficial History, vi, quoted by Robert Debs Heinl, Jr. Dictionary of Military and Naval Quotations, (Annapolis, MD: United States Naval Institute, 1967), 193.

spend at least an hour breaching obstacles and usually suffer severe casualties across the force. Another study did cite a well done breach that still took thirty minutes using manual techniques.[266]

Mechanical breaching shows varied success. The new tank mounted plow for the M1 tank proved itself during a recent rotation. The Army's Mine Clearing Line Charge (MICLIC) system failed to perform well.[267] Also, under perfect conditions a MICLIC only breaches 100 meters and mechanized engineer companies have only two MICLICs with two reloads each.[268]

Another problem common to every breach was the inadequacy of current marking techniques. These techniques are virtually identical to the ones designed by the British at El Alamein. Engineer tape, white in color and about two inches wide, is the universally used boundary marker. This tape is very hard to see in dust and smoke when both the driver and vehicle commander are "buttoned up" going through the lane.[269] Colored smoke is only effective at marking the entrance to lanes as long as someone stays there to continue throwing the smoke grenades.[270]

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[266] Captain David J. Capp, CAAT 87-11-4.

[267] Personal observation by the author.

[268] Sandoy, "Minefield Breaching", 11.

[269] Captain David J. Capp, 87-11-4.

[270] Lieutenant Colonel Heimgartner, CAAT 88-2, Executive Summary.

9. Artillery: The Emperor Has No Clothes

A common saying among artillerymen is that artillery is the "King of Battle" because it puts the [cannon] balls where the Queen [infantry] wants them. Sadly, National Training Center evidence shows that artillery rarely puts support where and when anyone wants it.[271] Some of this lack of effect comes from peacetime limitations. For instance, nothing can truly replicate the concussion, noise and obscuration of rounds impacting nearby. This limitation does at least "cut both ways", since neither side in the battle necessarily gains an advantage and no one has come up with a better way. Flares and simulators do indicate where fires land and casualties are assessed, so the many limitations do not invalidate the lessons. The most disturbing trends are the repeated failures stemming from inflexible thinking and a variety of frankly inexplicable omissions.

Out of eleven assaults, only three had artillery support described as good, and that sobriquet is a relative one taken from the unit Take Home Package write-ups. Every unit is different and individual errors should not tar an entire branch with the same brush. However, the following single examples are fairly indicative of the norm, and suggest that artillery employment overall has some serious problems. Maneuver units do not communicate their plans fully to artillery elements and the Fire Support Officer, usually an inexperienced officer, does not fully understand the maneuver elements. Artillerymen are not the only soldiers who have learned hard lessons, but the critical role of artillery

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[271] For discussion of artillery accuracy, see Martin Goldsmith, James Hodges, Marion L. Burns III, Applying the National Training Center Experience: Artillery Targeting Accuracy, RAND Report No. N-2984-A, (Santa Monica, CA: The RAND Corporation, 1990), pp. 9,27,39.

in assaulting fortified positions calls for a close look at the recurring problems both internally and in coordination with maneuver units.

Artillery preparatory bombardments occurred in each deliberate attack studied to some extent. For various reasons, these fires are rarely driven by intelligence, either templated or confirmed, of exact enemy locations. One glaring example was a fire plan which consciously chose not to adjust fires onto known enemy locations and then fired only a few targets of those planned. Those fired often missed the intended target area anyway. The Battalion Fire Support Officer attempted to explain that the spread of shells, or sheaf, from the firing battery would blanket the known grid since the estimated position was so close. Since the guns fired a linear sheaf spread north to south, it could not cover the targets, which were all offset to the east or west of the estimated positions. Another recurring action is the changing of target numbers or group names within the artillery chain. This requires fire direction center personnel to "translate" the requests for fire and slows the process down or causes the wrong targets to be fired. Also, artillery in the battles studied never fired close assaulting fires to help maneuver elements clear objectives. Not enough emphasis is placed on such fires by either maneuver units or artillery elements. One simple solution is to tie H-Hour to arrival at an assault line or similar graphic control measure, rather than the original Line of Departure (LD) time.[272] Another point which surfaces is the number of artillery pieces a unit gets for support in training compared to historical numbers used by various armies.

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[272] This idea as well as several other helpful comments throughout this chapter come from Major Beacon of the NTC Observation Division.

> ...A point of genuine concern is whether our battalion task forces are supported by sufficient artillery to provide the necessary level of responsive support in that role.[273]

Smoke is rarely ever fired by artillery. A previous section of this chapter described the slow shifting of smoke rounds during a battle and the excellent benefits smoke gives the attacker. During the After Action Review of this battle, no clear explanation for the delay could be found. The artillery officers up front radioed the corrections back to the fire direction center but for some reason either there or within the batteries, adjustments took far too long.

Counterfire, the doctrinally correct term for counterbattery fires, is done well when that counterfire is part of the preparatory fires preceding a deliberate attack. This counterfire is much less effective when ground forces are breaching obstacles.[274] Counterfire is the most critical role for artillery delivered indirect fires and must continue throughout the assault, as demonstrated at El Alamein. A common artillery mindset is that counterfire does not directly support maneuver elements. In fact, it allows ground units freer movement without suffering from defensive artillery which causes the highest percentage of casualties. Defending OPFOR artillery plays havoc with engineers and other exposed elements at obstacles. Artillery units in Direct Support (DS) of a certain ground combat unit count on other artillery controlled by higher headquarters to fight the

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[273] Goldsmith, Tactical Reconnaissance, 124.

[274] S.R. Robinson, 88-2-3 and 88-2-7.

counterfire battle.[275] This author contends that counterfire is not adequately stressed or trained in peacetime.

Bearing in mind that only recently has a major fortified position come into play at the NTC and that artillery pieces do not have MILES transmitters, a researcher can only look at the live-fire exercises to study artillery in the direct fire role. Since American, German and Soviet experience against bunkers, pillboxes and the like showed the necessity of using 155mm and larger guns for direct fire, this is a required skill to practice. A typical attack during the movement to contact phase of live-fire training also might include a large obstacle such as a log crib blocking a defile and offers a suitable direct fire target. Direct fire artillery should also have quite a psychological effect on attacker and defender alike. As far as this author could determine, no unit has ever used artillery in the direct fire mode during training at the NTC. Only the 3d Armored Cavalry Regiment (ACR) planned to experiment with this and deployment to the Gulf War precluded further training at the NTC.[276]

10. Air Support

Aircraft come in small numbers and Air Liaison Officers normally direct them toward enemy armored reserves. The difficulties of assessing losses from air strikes are more formidable than from other means and thus not enough facts exist to draw worthwhile conclusions from the NTC experience in this category. Since OPFOR artillery

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[275] The critical role of counterfire is echoed by Major Beacon, based on observation of eighteen unit rotations to the NTC.

[276] Quirk Interview, Major Beacon's comments and all records examined.

units are not physically there for the pilots to see,[277] the worth of close air strikes on artillery units cannot be examined.

11. C2

A majority of the lessons learned by soldiers training at the NTC could be described as Command and Control. This study concentrates on those lessons relative to synchronizing all available assets in deliberate attacks and breaching.

The major points that stand out relate to the actions surrounding obstacle breaching. Maneuver forces tend to sit back and wait for the engineers to announce that the breach is made. The resulting piecemealing means poor suppression of defenders by direct and indirect fires, poor obscuration of defenders' vision by smoke, and no violent assault passing through rapidly to overwhelm defenders with close assaults. Units tend to focus on the breach itself, rather than recognizing breaching as one of the necessary steps in destroying the defenders.

12. Special Weapons/Unique Employment of Assets[278]

Special weapons, as discussed in previous chapters include such equipment as flamethrowers, various mechanical mineclearing devices and others. Unique employment of assets covered such things as using walking wounded to escort prisoners, military police to man obstacle gaps and artillery in the direct fire mode. Almost none of these

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[277] The OPFOR artillery units are played on the computers in the "Star Wars" building and electronic means of target detection are replicated so that artillery can use its own equipment and tactics for counterfire.

[278] Readers should note that the term Special Weapons in this thesis is not synonymous with the U.S. Army's artillery term for nuclear weapons.

things are done at the NTC for several reasons. Flamethrowers are not in the U.S. Army inventory anymore. A weapon known as the M202 Flash is apparently a replacement, however, this author has never seen one of those fired and no records exist of its use at the NTC. Units of the 7th Infantry Division (Light) fire this weapon twice annually. It has a very large backblast area which will cause problems when used within trench systems.[279] Prisoners are not played during battles and military police are deployed in very small numbers, but still could be used as the British did. Artillery and mechanical mineclearing means were previously discussed. The amount of mine plows and rollers is unknown to this author, but none have been deployed to units this author has served in during past years. As this is written, open press film shows many plows mounted on M1 and M60 tanks deployed to the Gulf War.

13. Learning Points

Several points gleaned from historical lessons are being trained at Fort Irwin. The need for units to get the most value from this valuable training time leads to training units doing as many operations as they can in the time available. Regular deliberate attacks have a "prep" day beforehand to allow scouting and rehearsals. The new, larger obstacle complex facing brigades calls for much more thorough scouting. If two "prep" days precede an attack, the training benefits may prove worthwhile. A longer preparatory time would also open up the possibility of a surprise attack, done without artillery the night after the first day when the defenders do not expect it.

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[279] Information concerning the use of the M202 by the 7th Division comes from CPT Pete Blaber, an infantry company commander in that unit.

Scouting and infantry infiltration are topics addressed by all units with varying success, which is natural in training. The lack of smoke and generally weak artillery efforts both indirect and direct is disquieting. Units do not train with flamethrowers or other flame weapons in amounts anywhere near what previous armies used in combat. Tank-infantry cooperation below platoon level is rarely in evidence.

VIII: SUMMARY, UNIFORMITIES AND CONCLUSIONS

> The smallest detail, taken from an actual incident in war, is more instructive for me, a soldier, than all the Thiers and Jominis in the world. They speak, no doubt, for the heads of states and armies but they never show me what I wish to know-a battalion, a company, a squad, in action.
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> *Ardant du Picq, Battle Studies*

A. SUMMARY/UNIFORMITIES

This section will summarize the relevant information in each of the subsections. The reader should bear in mind that almost all the historical battles studied contained defenses in depth consisting of several belts of obstacles or defensive positions, or both. Most of the actual defensive positions were strongpoints of some type rather than linear trenchlines manned equally throughout. All the defenses had outposts nearest to the attackers to wear down those attackers before they reached the main defensive positions. These historical battles were on a much larger scale than the National Training Center exercises covered can be, and thus drawing direct comparisons must be done carefully. The overall focus of this chapter is to identify the critical factors that commanders and staffs must consider in planning any attack on any kind of fortified position. The summary portion will refresh the reader on certain critical areas.

1. Use of Intelligence/Patrolling

The role of intelligence on planning directly reflected national characteristics. The more technologically oriented Americans and British had excellent signal and aerial

intelligence and did not aggressively patrol on the ground to confirm this.[280] The Germans and Soviets used any intelligence available but put great emphasis on ground patrolling. This continued on into planning. American and British planning did not rely heavily on the intelligence itself. Allied planning certainly did not ignore it, but it did not always "drive the train" until later in Europe at the Siegfried Line. The Soviets, considering intelligence to be the "...basic precondition for a successful breakthrough of deeply echeloned positions", used it when possible and actually called off artillery fire in Manchuria because the intelligence was not firm enough to guide it. The Germans at Kursk had the best opportunity to gather intelligence and made the most of it. Basically, the American and British style was to gather intelligence, while the Soviets and Germans fought for it.

Not surprisingly, when an army did not have unchallenged air supremacy, part of the intelligence effort was devoted to concealment and deception. The British devoted tremendous energy to BERTRAM at Alamein. The Germans and Soviets at Kursk both took countermeasures. The Manchurian campaign started off with Soviet troops marshalling and moving under miles of netting and at night to avoid chance Japanese observation. Overt actions, such as artillery practice, lulled the Japanese into complacency and reinforced what they already wanted to believe.

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[280] This comment relates only to these battles. The Australians defending Tobruk patrolled very aggressively. Vigorous patrolling is also considered a British trademark as was proven again in the Falklands War.

NTC experience shows that American characteristics remain unchanged. Signal and other intelligence is gathered as much as possible. Units have also learned the absolute necessity of ground patrolling and are improving in that area. Units that gather intelligence well and use it to "drive the train" do well and others do not. American force structure emphasizes stealth and gathering information, rather than fighting for it.

2. Use of Obscuration/Smoke

Use of smoke and obscuration initially differed along the same lines as did using intelligence. The Americans in Europe and the British used little smoke. The British at Alamein did choose a night attack for concealment. The Germans and Soviets loved smoke and used it as much as possible. American Marines, and the Army later in Europe, also used smoke extensively at lower tactical levels. Only the Soviets and Germans tried to use it in very large quantities and across large frontages. On this point, as well as others, the reader should recall that the Soviets studied under German tutors early in the war and imitation is the sincerest form of flattery.

Americans, with air supremacy, overwhelming firepower and a desire to keep casualties to a minimum, chose not to do many attacks at night. The Germans and Soviets used the hours of darkness as much as possible for infiltrating infantry and for doing engineer work. Both of these armies met with a great deal of success with such tactics.

Besides just using smoke, Germans and Soviets used it very well and in different ways. Germans placed smoke on top of defenders and thus retained their own good visibility. The Soviets, at least in their doctrine, used smoke on top of defenders

and between attackers and defenders for screening. They also screened wider fronts by laying smoke in intervals to create infiltration lanes, degrade interlocking fires and stretch their supply of smoke.

Current Army training does not utilize smoke as heavily as past armies did. The OPFOR uses it extensively and gets good results. U.S. technical capabilities do allow and encourage U.S. Army units to fight at night, where enemy systems are degraded far more than American systems are.

3. Tank/Infantry Cooperation

In this area, the British stand out as the only army to consistently have serious problems coordinating efforts. The Americans in Normandy initially had the same problems but learned rapidly. All other forces relied on close cooperation for success. Another point for the reader to recall is that the battles chosen mostly occurred later in the war, after soldiers learned what worked. Since all armies stressed this point after combat experience, the argument carries considerable weight.

Germans and Soviets sent infantry and engineers forward under cover of darkness to begin prying apart the defensive systems. Then, other units attacked across a narrow front. Germans, Soviets and Americans all attacked in waves, with tanks leading if possible. These armies settled upon a ratio of roughly one tank for every one infantry squad (with or without its carrier) as their mix of choice. All these forces also used some sort of "processing" or "marching fire" to pin defenders and gain fire superiority. The German units equipped with well armed *SPWs* could do this with a portion of their force and continue the mission with the rest.

The infiltrating units, and many other attacking units organized themselves into assault teams. These small groups were **the** very best way to take on pillboxes, bunkers and strongpoints. With flamethrowers, automatic weapons, explosives, tanks where possible and high testesterone levels, these small groupings had enough portable firepower to reduce defenses. These assault teams varied in size from roughly squad to platoon size and showed the value of breaking down units into very small and decentralized elements. Units training at NTC do not often use such groupings. The compressed training time available, compared with the build-up time before historical battles works against the cohesion and training necessary for such groups to fully work.

4. Engineers

Engineer utilization fell out into a pattern similar to the other areas analyzed. British utilization fell on the low side. American utilization fell in the middle and the Germans and Soviets used engineers for a variety of missions. British engineers concentrated on clearing lanes through obstacles. Although certain mechanical means, such as the Flail tank came out, breaching remained primarily a risky, slow, manual job. The engineers tended to operate alone, in keeping with British style. The British continued to have problems with clearing enough lanes through obstacles and with echeloning their engineer effort throughout the depth of the attack.

American engineers mostly emulated their British counterparts. They did, however, play roles in assault teams and assisted in bunker reduction and sealing. Some units also went into action during COBRA prepared to clear routes through the devastation to keep supplies moving forward. Such planning recognized the need for

engineer work throughout the depth of the battle. The very decentralized nature of fighting against the Japanese saw engineers working closely with infantry and armor in reducing positions.

The Germans put forth much effort in training their engineers. These soldiers played a key combat role during infiltration attacks and in reducing strongpoints. Flamethrowers of many types saw use along with demolitions. Other engineers cleared mines manually and also used the "Goliath" as a mechanical means. When possible, engineers simply marked mines and troops went around them. Training given by engineers to infantrymen in spotting mines paid off well.

Soviet engineers closely emulated the Germans and appeared in greater numbers (a common Soviet trait). Soviet engineers went deep for reconnaissance as well as working throughout the depth of the attack. The Soviets, recognizing the destruction implicit in such combat, detailed infantry units to follow attacking units to add manpower to engineers clearing supply routes.

No army ever came up with a fully satisfactory mechanical breaching means. NTC observations show that the mine plow is still the best available mechanical device. However, most breaching is still done by the slow, dangerous manual method. The recent Gulf War did show one technological leap in manual breaching, though. Engineers now probe with plastic rods rather than metal ones.

5. Artillery

Artillery is the most critical factor in assaults of this type and different armies used it in a variety of ways. Artillery is the main weapon available to the attacker to

degrade defensive capabilities by hitting weapons and troops, obscuring their observation, or degrading command, control and communication.

The British used artillery in a very rigid, WWI style. At Alamein the artillery schedule, eerily reminiscent of the Somme, proceeded forward on a time schedule with the infantry "leaning-on" the barrage to get at defenders immediately. The British guns fired counterbattery missions first, but then fired only the rolling barrage. In GOODWOOD, artillery could not range to most of the defenses and so played a less significant role. All British shelling started at H-Hour and carried the troops through the first kilometer or so of the defenses. Gunner officers did not tailor their barrage to the differing tactical realities as well as required.

American artillery earned a good reputation based on sheer weight of fire and efficient control. Problems certainly existed in combining efforts with ground forces. Infantry usually did not "lean-on" the barrage and so lost the effects of most of the fire. Units did learn that artillery could pin defenders in their shelters and enable attackers to win the "race to the parapets" if attacking ground troops moved rapidly enough. "Time fire" worked well there and this advantage seems to have lain mostly with the Americans. During attacks upon concrete pillboxes and similar reinforced bunkers, soldiers learned that only shells of 155mm or larger could do serious damage. Direct fire with such weapons was the only sure way to destroy such positions without resorting to direct ground assault. Artillery could aid deception efforts by firing across a broad front before attacks. Such fires usually fell in the following order; antiaircraft gun suppression, counterbattery, and finally on the defenses themselves.

German techniques differed for several reasons; less sophisticated fire control, fewer self-propelled guns and different organization. German infantry units had artillery pieces known as "infantry guns" of up to 152mm for direct fire support. When supporting good infantry who used infiltration, artillery would wait until called to fire, thus maintaining surprise. In keeping with the decentralized fighting style, many units in breakthrough zones received artillery batteries dedicated to them for support. The unit *VB* would speak directly to this battery for support. In keeping with German emphasis on surprise and morale considerations, *flak* weapons pouring out tracer rounds in direct fire made a significant contribution. In contrast to the American and British sequence of fires, German gunners would sometimes fire at defensive positions, covering troop movements, and then shifting to counterbattery fires after defenders opened fire.

Soviets always placed great faith in artillery and especially in assaulting fortified positions. Some techniques paralleled German ones. Soviets used a large amount of direct fire and also used dedicated batteries. Soviet artillery, along with German guns, fired on obstacles such as wire and minefields to blast paths through for advancing ground forces. With greater numbers of guns available, Red Army gunners could use creeping barrages of five to six batteries firing on one kilometer of attack frontage. Soviet engagement priorities differed slightly form others. Barrages first hit defensive works, then fired counterbattery and finally blasted obstacles. The two battles studied illustrated two worthwhile points concerning the value of intelligence. In Manchuria, when intelligence could not give enough information, the commander canceled the bombardment and relied on surprise. If the shelling could not do its job, it would

only alert the enemy. In the Arctic, the barrage failed to achieve the desired effects because German positions could not be located accurately enough.

Current American training does not include most of the techniques mentioned here. Units do not use artillery in direct fire. NTC rarely sees close assaulting fires. Artillery units do not feel they are supporting maneuver units by firing counterbattery and that mission is doctrinally done by higher echelons. Artillery does fire on likely enemy antiaircraft positions as Americans did during the Siegfried Line Campaign. U.S. artillery doctrine only mentions a dedicated battery as a possibility during a movement to contact.

6. Air Support

Utilization of air assets saw many similarities between the nations studied. The primary mission of all air forces was to achieve air superiority to keep defensive air away from attacking ground forces. Different forces met with varying success in this endeavor.

The British had no workable system to control close air support at the time of Alamein. British air concentrated on hammering the *Luftwaffe* to protect British and Commonwealth ground units. Aircraft engaged in battlefield interdiction by attacking defenders' armored concentrations and hitting supply lines. In GOODWOOD, the song remained basically the same. By then, however, rocket firing Typhoons of the RAF flew close support as much as possible. Of course, GOODWOOD also saw heavy bombing intended to blast a path through the defenders for the armor to dash through.

Americans always enjoyed air supremacy over their enemies. American air devastated units trying to move up to the battlefield. Resupply became a chancy affair

with fighter-bombers prowling over the roads. Airborne artillery forward observers performed yeoman service in calling fires to assist ground forces. Less stellar was the carpet bombing for COBRA. Although it struck the Germans with great force, it also killed many Americans. The technology of the day could not effectively control so much firepower so close to friendly troops.

The *Luftwaffe* sought air superiority, or at least parity, over Kursk. Since the Germans had *Stuka* dive bombers, their pilots could support them much more directly than other pilots could support their ground troops. *Stukas* concentrated on enemy artillery and armored reinforcements. In this manner, they helped immensely because defensive artillery was the greatest threat attackers faced. By placing forward air control personnel down at company level in breakthrough sectors, the Germans had more control and flexibility over their tactical air support.

Soviet pilots had three priorities to support a breakthrough. First, they were to gain air supremacy, then hit defenses. Lastly, they performed battlefield interdiction to hinder defensive repositioning or reinforcement. Bad weather degraded the capabilities of the air units in the battles studied, so definite conclusions of their effectiveness cannot be drawn.

7. C2

Preparation for most battles included some form of rehearsals. The British conducted the most in terms of both quantity and quality. This grew from two factors: the rigid timing of the barrage and the proven lack of cooperation between branches. This emphasis on rehearsals paid off in soldier confidence throughout the battle. Other

detailed techniques of command and control stemmed from both the British style and Montgomery's personality. Control began far behind the lines as units moved up under cover of darkness. Lighted symbols (Diamond, Double Bar, Square) marked routes with clarity and simplicity. Naming strongpoints and minefields made similar contributions. Tracers firing along unit boundaries and searchlights wagging as the barrage shifted all helped coordinate the movements and actions of men and weapons. The traffic control begun behind the lines continued through the obstacles as Military Police directed traffic at minefield gaps.

In GOODWOOD, preparations did not include such thoroughness. Much of this stemmed from the much shorter planning time. Planners did not seem to fully consider the German defenders in the planning and the lack of well thought out control measures, coupled with a large number of burning command tanks, meant that little could be done to meet a situation different than the one planned for.

For the Germans, the C2 considerations at Kursk included many of those found at Alamein from the standpoint of higher level control. Tracers and searchlights saw some use as navigation aids. Very centralized planning and tightly controlled execution ensured smooth movement forward in the nights before the battle. Simple measures such as lighted symbols marking routes made the task more manageable. Most other C2 factors grew from the entirely different organization and mentality of the German's tactically. Supporting arms answered to combat unit commanders at a lower level than that which other armies' supporting arms did. This worked only because of the more thorough training and longevity in position of German officers. Such longevity

and cohesion meant that German units did not always need the thorough rehearsals others did. Germans often just talked the plan over while looking at the ground or a map. Flare signals could convey much information to another soldier well versed in the unit's procedures. This must be understood by the reader in drawing conclusions.

Americans adopted the technique of rehearsals after much bitter experience. Such training built trust and allowed units to work through problems and find solutions (such as field telephones attached to tanks for infantry coordination). American strengths in C2 came at higher levels in coordinating the abundant firepower available. This overwhelming firepower had a great effect on defending units' C3. Disruption of communications degraded the ability to mass counterattack forces or gather an accurate intelligence picture.

The Soviets possessed neither the radios and technological predilection of the Americans, nor the training and cohesion of the Germans. In light of this, their command and control procedures were different, but no less valid. Red Army forces conducted thorough rehearsals by participants before large scale operations. This did not promote flexibility, but the simplification and clarity of understanding attained offset drawbacks. Streamlined supporting-to-supported relationships (dedicated artillery batteries, for example) eliminated the need for a large amount of communication. Simple means of signalling, such as flares, transmitted information quickly and as well as possible under the circumstances.

In this area, comparisons with current U.S. training at NTC must be drawn carefully. NTC maneuvers are at battalion and brigade level and do not have the plethora

of other units around the battlefield. One area this paper examined was the focus on the actual breaching. Since other armies had a deep objective, they seemed to breach obstacles and then get on with the mission. Americans in training get fixated on the breach itself and do not seem to break through as others did. This author is uncertain if the many differences between training and reality (small things such as real bullets, real blood and the like) are the reason or if our fixation on the details keeps us from doing it as well as we should be able to.

8. Special Weapons/Unique Employment of Assets

In this area, no truly marked differences existed between the forces examined. One universality was that new weapons never worked as well as hoped, but that truism is not confined to assaults upon fortified positions. One other constant was the primacy of flamethrowers, both vehicle mounted and manpacked. Other factors come up more often than not. Attacking bunkers, pillboxes and similar positions requires bangalore torpedoes to breach wire and pole charges to get explosives right where they are needed. The heavier the firepower available (such as strategic bombers), the better. Such use must consider two things, however. If precision cannot be guaranteed, then ordnance must be removed from friendly troops. If the ordnance is to be delivered close to friendly troops, then precision must be achieved by some technique. DESERT STORM validated the concept that, "fire-power...could be concentrated to such a degree that it was possible to burst through any purely static defensive system and then keep on attacking and

advancing."[281] German and Red Army experience refuted beliefs that artillery could not clear a significant percentage of mines in a small area. All forces tried various mechanical techniques for breaching obstacles. These included Flail tanks, mine rollers, fascine carriers, "Ark" tanks, and explosive breaching devices such as the "Goliath" and the "Snake."

B. CONCLUSIONS

This study examined myriad factors, techniques and ideas to find the absolutely critical few points a good commander and his staff must consider so that an assault by American soldiers upon a fortified position does not become "...a scene of sickening and ghastly horror."[282] This section will list the factors that planners must at least consider seriously before attempting such an attack.

In 19th Century warfare, defenders usually surrendered after attackers achieved a successful breach of the town walls. This breach defeated the soldiers of the garrison "in their own minds." If the defenders chose to fight, a group of volunteers known as the "Forlorn Hope" led the assault. These men clawed their way over the rubbled, obstacled and mined approach to seize a foothold. Their "...suicidal task was to draw the defenders' fire, force them to spring their carefully prepared traps, and clear a bloody path for the

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[281] Bidwell, Firepower, 216.

[282] Captain Edward S. Godfrey in a personal letter describing Custer's battlefield. Quoted by Francis B. Taunton, Custer's Field: "A Scene of Sickening and Ghastly Horror" (London: Johnson-Taunton Military Press, 1987), 1.

battalion that followed."[283] The historical studies in the preceding chapters present modern commanders with many ideas. Careful use of weapons and tactics available will allow an attacker to defeat a defender "in his own mind." Proper employment of men and weapons will nullify rather than draw defenders' fire and ensure that an assault is not suicidal task. Better technical measures will overcome the carefully prepared traps.

When contemplating the assault of a large fortified position one must first ask what actually causes casualties to attackers. Defenders' artillery fires cause the large majority of casualties among attackers. The second leading casualty producer is direct fire from heavy weapons. Mines cause some losses, but mainly help artillery and direct fire do the killing. The reader must bear in mind that almost all defenders in the battles studied did not succumb to what John Keegan referred to as "the loneliness of the battlefield" and give up or hide. Instead, they offered fierce resistance because they did not believe themselves beaten.

The next task is to find out what, if anything, prevented breakthroughs of the fortified positions. Previous chapters show that if the attacker has overwhelming strength, especially in the air, then eventual breakthrough is almost certain no matter how well or how poorly the attack may be conducted tactically. Where the attacks did actually fail,

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[283] Bernard Cornwell, Sharpe's Company: The Siege of Badajoz (New York: Penguin Books, 1982), 12. Cornwell's novel captures the essence of the action. The actual "Forlorn Hope" at Badajoz met spikes, water filled barriers, smashed wagons, a *chevaux de frise* (sword blades emplanted in wooden beams), *fougasse*, mines and powder barrels. When the defenders fired these, they slew, scorched or disabled almost every one of the 500 volunteers. See Charles Oman, A History of the Peninsular War. Vol V. (Oxford: Clarendon Press, 1914), 246-248.

GOODWOOD and CITADEL, reserves stopped the penetration after the fortified positions had levied a heavy toll in men, material and the most critical asset of time.

This analysis indicates that to win such a battle the attacker must put the greatest emphasis on getting through the position rapidly and cleverly enough so that the defending commander cannot commit reserves at the right time and place. To achieve the actual penetration, the attacker must defeat or nullify the defenders' artillery and direct fire. If that can be accomplished, then obstacles can be breached or avoided with limited casualties. Since such nullification cannot be counted upon, rapid means of mechanical breaching assets should be available. A key point to remember is that there is some objective of the operation to remain focused upon. Actually breaking through the position is merely a means to an end. Assaulting a fortified position, while a deliberate attack as defined by the U.S. doctrine, is a unique entity and requires very unique task organization and equipment. The considerations and techniques discussed in the remainder of this chapter are situationally dependent and some are mutually exclusive. The author believes that all must at least be considered in order to give the operation as full a chance of success as possible.

1. Intelligence/Patrolling

A detailed, accurate intelligence picture of the actual enemy defenses must "drive the train." The nature of the defenses must prescribe the manner of attack. (Assault teams using infiltration is excellent to take out outposts, but less effective against a main defensive belt.) All possible technical means should be pressed into service to paint this intelligence portrait, but the final arbiter is always ground reconnaissance.

Aggressive patrolling acquires the best intelligence and helps achieve moral dominance over the enemy.

Bearing in mind the continual attack upon the enemy commanders' minds, deception must also play a key role. Camouflage and other means must mask friendly deployments, strengths and intentions. Let *maskirovka* (masking) and *khitrost* (cunning) be the watchwords. Electronic jamming of defensive intelligence radio nets will help to blind defending commanders and delay decisions. When the battle is joined, jamming artillery nets will be worth one or more batteries devoted to counterbattery. Recall that one major effect of artillery fire was to degrade defensive C3. Jamming will play a significant role in such activities and make artillery available for other missions.

2. Air Support

With good intelligence in hand, the commander now examines his resources in order of their importance to him. Aircraft delivered ordnance is, more than ever, the heaviest, most portable firepower available. Precision guided munitions (PGM) and other technological advances in radar and the like ensure that fire effectiveness is achieved, rather than the more indiscriminate application of firepower across the landscape.

In support of the actual assault of a position, the first priority for air assets is battlefield air interdiction (BAI) to keep large reserves from influencing the fighting.[284] Herein lies one of the initial trade-offs at which some breakpoint level must be determined. The size of available defensive reserves in relation to the size of the

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[284] This discussion assumes that the Air Force can achieve at least air parity over the fighting. Air assets discussed by the author are those devoted to tactical air support missions (TACAIR).

attacking force must dictate how much air support is sent after them. At some point, aircraft will become more valuable if allocated towards the second priority of air support - attacking defensive artillery. Only so much friendly artillery will be available and it will have many missions. Aircraft giving "close enough" air support hunting for offending batteries will have a very direct effect on the health and longevity of friendly ground troops.

Another form of air support should not be forgotten. Airborne forward observers should be employed if possible to maximize the effectiveness of artillery fires. These aircraft and other scouting flights provide valuable updated intelligence which will continue to guide the proverbial locomotive throughout the battle.

3. Artillery

Indirect fire assets will be the most heavily tasked asset the commander has. Indeed, if he asks for nothing else, the commander should ask for more artillery support. The first priority for guns and rocket launchers is counterbattery fire. This fire must continue throughout the entire battle, although it should not always be the very first mission fired.

The second priority of artillery fire is smoke missions. A key decision for the commander to make is how many tubes should be allocated towards smoke missions and how many to other missions. Smoke will play a key role in degrading the direct fires that are the second greatest killer of attackers. This smoke should almost always be fired directly onto the defenders if possible. Such missions should be fired on call when attackers are in their assault positions. Once the smoke is built up, then attackers should

approach and begin assaulting the main defensive positions.[285] Smoke should be fired across a wide front in the Soviet style. It will create lanes for the attacker and break up defensive fires. It also contributes to a sense of isolation on the part of the defender.

The third priority to consider is that of direct fire artillery. Assaults should always be initiated by the greatest mass casualty producing weapon available. A volley of 155mm gunfire presaging a dark and stormy dawn would be a truly significant emotional event for the occupants of the bunkers targeted. Such fire would also motivate attackers and cover the last movements of those attackers as they closed on the positions. Recall that steel-reinforced concrete bunkers are impervious to shells less than 155mm. This could be one role, although not necessarily the primary one, for a dedicated battery of guns in a key breakthrough area. The concept of a dedicated battery greatly simplifies command and control as well.[286]

A fourth priority is the potential for artillery fires massed on a small area to detonate the mines within that area and rapidly clear a path for assaulting forces. While much current thinking derides the effectiveness of this technique, both Soviets and Germans used it in combat, so there must be something to it. Massed fire on obstacles should significantly cut barbed wire and perhaps fill in portions of antitank ditches.

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[285] Current U.S. Army publications prescribe a technique known as SOSR: suppress, obscure, secure and reduce. This author contends that obscuration should be the first task. Note also that this passage is not intended to apply to infiltrating assault teams, but rather to the main forces.

[286] Current U.S. Army techniques only mention the dedicated battery in a Movement to Contact mission and do not encourage its routine use in that role.

The indirect fire asset at the maneuver battalion level is the mortar platoon. Mortars will play a key role in an assault in two ways. First, mortars deliver the most rapid smoke available and should be able to shift their fires more rapidly than cannon artillery assets can. Most of a mortar platoon's basic load should be white phosphorous rounds to support the assault of a fortified position. Mortar smoke builds up faster, while artillery delivered smoke lasts much longer. The second key role for mortars will be to fire air bursts on top of defenders to provide close assaulting fires for ground forces. Such fires will pin defenders inside shelters while attackers win the "race to the parapets." A commander should consider massing several mortar platoons together to support the initial attacking unit as it achieves a penetration.

Artillery also has a more reactive role to play in this operation. Commanders should prioritize breaching sites for designation as Critical Friendly Zones (CFZ). Artillery acquisition radars will cover those areas to detect enemy batteries firing at those targets. Such batteries then move to the top of the counterbattery hit parade.

4. Engineers

Engineers play several key roles throughout the total depth of the assault. A portion of the available engineers must accompany assault teams infiltrating into the defenses. These engineers will assist in reducing strongpoints and will breach as many obstacles as possible. The most important factor in employing sappers is to do so throughout the depth of the entire attack. While dismounted engineers go in with the assault teams, others with their MICLICs (Mine Clearing Line Charge), Combat Engineer Vehicles (CEVs), and the like will accompany other attacking units.

Engineer work must widen the initial lanes through obstacles and clear areas off to the side of those lanes. Units need room to deploy artillery pieces, aid stations, command posts and such. Battles of this nature always have long columns of vehicles moving nose to tail along the few cleared lanes which invites disaster. Fresh engineer units should be attached to follow on units to clear fresh lanes. The existing lanes, if not blocked by exploding vehicles, will be needed for the initial units to send wounded back and receive supplies. These fresh engineers will also seal up bypassed bunkers to prevent enemy infiltrators from reoccupying them.

5. Tank/Infantry Cooperation

While other assets available to the commander are more critical to the overall outcome, tank-infantry teamwork is the absolute cornerstone of the entire attack. If this linkage is weak, excessive casualties will result and the attack might even fail from excessive losses in men, equipment and time. The actual defensive disposition will determine how the commander will best organize his armor and infantry for the assault.

If the defense is in depth, with outposts protecting the main obstacles and defensive positions, then a substantial portion of infantry should infiltrate into the defenses. These troops may destroy outposts or try to get deep to engage defenders throughout the entire fortified position when the rest of the attacking force begins its assault. These units must carry a mix of weapons, especially flame weapons. Engineers will accompany these troops as well as tanks if the defenses are dispersed enough to allow this.

The main body of the attack will be comprised of roughly equal numbers of tanks and armored personnel carriers (APCs) with their infantry squads. Tanks should lead the assault utilizing "marching fire" and with indirect fire air bursts close in front of them. If mines are expected, several tanks with mine plows should lead abreast, clearing a large lane as they go. With proper smoke to offer concealment, these plows should break out near defenders followed by several other tanks and APCs which are all laying down suppressive fires. A high volume of fire by tanks of the supporting elements and the plow tanks themselves must be maintained. The basic ammunition loads of the tanks must be modified to include far more high explosive rounds than are normally carried. If obstacles can be breached or bypassed, a mounted assault is faster and less costly than a dismounted one. Some combat units also must be positioned to guard the flanks and to engage the bypassed units that continue to fight on or counterattack out of their positions.

6. Special Weapons

The U.S. Army does not currently possess enough proper equipment to ensure a rapid mechanical breach of obstacles. Specifically, better mine plows must be developed, fielded and tested in training. A armored variation of the Vietnam-era "Rome Plow" may be the answer to finding a powerful enough plow with a large enough blade. Fuel-Air Explosives (FAE) can be delivered by aircraft or surface launched. These devices first spray out a cloud of fuel and then ignite it with a small explosive. The resulting detonation, aside from being relatively spectacular to observers a safe distance away, causes a sudden increase in pressure which will detonate mines. The technology

exists, but until recently development and acquisition had been discontinued. Press coverage of the Gulf War showed that such devices were used to some extent against Iraqi positions during DESERT STORM.

The MICLIC does not breach a large enough lane. The British Giant Viper is more capable. Both of these designs are flawed because the devices are trailer mounted. The best design would be a variant of the Polish T-55 mounted "Snake." This vehicle incorporates two line charges in coffin-like boxes on the rear fenders of a tank. Such a design gives protection, portable firepower and mobility in one package.

The British also have bundled plastic fascines available. These can be mounted on APCs and dropped off by firing explosive bolts. The bundles drop into ditches to enable vehicles to cross.[287] Special devices such as these are fairly simple in design and employment. Their development and acquisition need emphasis in peacetime. In wartime, logistics planners need to consider the time and cargo carrying requirements to get these devices up to the units when needed. Tactical planners need to know to request all the special weapons necessary.

Flamethrowers saw great amounts of usage during WWII, mainly for their psychological effect. They also provide some short term screening for attackers. While such devices did possess obvious drawbacks, their continued use in combat argues well for their use today.

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[287] Quirk, Interview, 21 Nov 1990.

7. C2

The goal of each commander is to effectively use command and control to maximize effective combat power. The complexity of assaulting a fortified position requires decentralized C2 procedures and simplicity in command relationships. Most of the solutions and procedures are simple, while some are more technical.

The greatest difficulty lies in the attackers knowing where they themselves are in relation to other attackers and known defenders. Several simple control measures exist. First, attackers could use a "thrust line" such as Rommel's 7th *Panzer* Division first used in 1940. A single arrow, with no more than one change of direction in it, would delineate the main effort of the attack. With the line graduated in certain increments, positions could be given as right or left of whichever hash mark on the line was closest.

Another system is to name obstacles, strongpoints and such, especially in some familiar pattern. With known minefields named M2, M4, and so on, new ones encountered could be named M1, M3 and so on. This would make locations clearer to all interested parties. Strongpoints and known defensive positions named for towns local to a unit's home station would help keep all positions in their proper relationship.

Tracers fired from Vulcans or other weapons will mark unit boundaries (at least until tracer burnout). These tracers should include another color to enable observers to differentiate between these controlling fires and actual engagements. Along the same line of thought as tracers is the use of illumination rounds fired deep behind the enemy to guide attackers.

The most significant problem in locating friendly troops arises when infiltrating units operate across a wide area and artillery preparatory fires are planned. No-Fire Areas (NFAs) are normally used but the confusion of combat may prevent units from reaching these areas. The Global Positioning System (GPS) now has small portable sets. If infiltrating units have such a device and the data can be sent to the artillery units, fratricide can be avoided. As the chapter on the NTC showed, all such techniques need to proofed in training before units actually try this technique in combat.

Tanks provide the best portable firepower to help infantry subdue stubborn positions. The M1 series of tanks do not have infantry telephones to facilitate control of fires. The armor and infantry FM radios are fully compatible, but phones would be more effective, accessible and would alleviate overcrowding on radio nets.

Traffic control throughout the operation is a critical action. A massive number of vehicles will be channeled into a finite number of gaps in obstacles. Simple techniques such as lighted symbols designating routes named Star, Diamond and the like will help simplify movement at night. On the battlefield itself, traffic control points (TCPs) will control the forward movement of vehicles close to the lanes to lessen the danger of losses from enemy fire. Combat units should man such points when they are fighting just ahead. Military police (MP) units should assist to insure continuity as units move forward.

Overall, delegating control of most assets to lower units will increase chances of success. Forward air control personnel should be pushed forward in greater numbers than the current one per battalion to insure no loss of control of critical assets. Task

organization will probably be very different from normal unit configuration. Americans organize into breach, support and assault elements and such a breakdown may amalgamate two maneuver battalions into those three elements under brigade control, rather than having one battalion do the breach and support while the other waits to assault through. The decision to radically change task organization should be considered, but too many situational factors exist for this author to try to dictate a certain task organization.

This study examined a range of battles, armies and time periods to find the critical factors involved in successfully assaulting a fortified position. This primarily historical examination, coupled with lessons from the various Combat Training Centers in the Army and now with experience from the so recently completed DESERT STORM, may contribute to an increased capability to conduct such operations. With the considerations mentioned in this paper and a good amount of luck commanders will hopefully have a better chance of success. In peacetime, soldiers must always bear in mind the words of Appius Claudius the Blind to the Roman Senate- "If you value peace, be then prepared for war."

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